THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. OCTOBER 1, 1896. CHICAGO, ILL. NUMBER 40.

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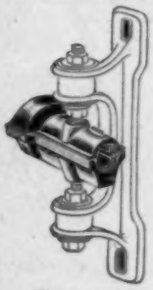

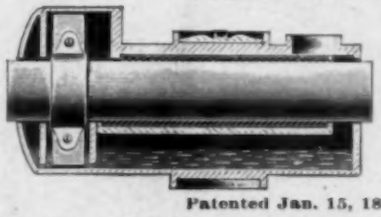

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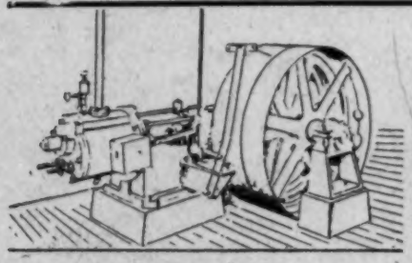

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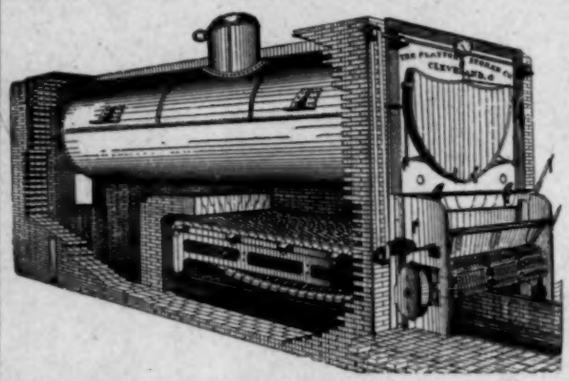

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THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. OCTOBER 1, 1896. CHICAGO, ILL. NUMBER 40.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Continued activity in pig iron, but no marked change in the schedules of the mills or of the market for their product, is the situation in brief at the close of September. It is safe to say that the sales of pig iron for consumption for the month were equal to the total consumptive demand for two months preceding; and with some selling firms the September bookings were equal to those of the entire summer, leaving speculative sales out of the account. There is no exception to the report of firmer prices, and the low figures of August are exceeded by from 25 to 50 cents to-day on prompt business, while in cases where contracts for the first half of 1897 are entertained, a further advance of 25 cents is asked. The list of active furnaces has been further diminished in September, and while the restriction was not so great as in August, production and consumption are approximating. Reductions in pig iron freights on both Southern and Northern iron have relieved buyers from a portion of the advances made by furnaces, but have not changed the competitive advantages of various districts. On No. 2 foundry a number of Southern furnaces are now asking $7, Birmingham, while producers in the Mahoning and Shenango valleys quote 25 to 40 cents above their August basis. Bessemer iron is fairly $11 at valley furnaces. Unsuccessful efforts by speculative buyers to get a lower price on October and November deliveries have been reported in the past week. The coke situation excites some comment, in view of reports that the leading interest has been getting back some business taken from it at cut prices a few months ago. The inference is that the $2 price is not inflexible. The markets for mill products show that in a small way there is a disposition to anticipate the November result, but the average buyer is running stock very low and letting season contracts wait. The starting up of a number of mills in the same week is not as significant of reviving demand as of the fact that orders accumulated in late shut-downs called for a beginning of deliveries in the fall. But mills that are running this week may be shut down in part in another 10 days. Prices on finished material show no change; all are weak except those sustained by agreement. On some products—plates, angles, bars and wrought pipe—the lowest prices of the year are possible on deliveries in the next two months. Inquiries from agricultural buyers have been better the past week and in the Pittsburgh district and the Central West figures are being made on upwards of 10,000 tons of bars. The nail pool meeting at New York has developed another crisis in the existence of the association, with predictions at variance as to the outcome of the recent cuts in prices. The meeting is still in session at this writing.

THE CLEVELAND DISTRICT.

Sales of non-Bessemer ores in September have amounted to a respectable total. The change in the price basis may be judged from the fact that a Menominee ore that sold of $2.65 in the early part of the season has lately brought $2.40. Buyers have made offers on Mesabi non-Bessemer ores, and some transactions have resulted, with prices in the neighborhood of $2 a ton. So far as Bessemer ore is concerned nothing is to be expected for some time. When idle furnaces are ready to start again there may be a renewal of buying on a small scale and stocks will be found on the docks to supply such needs. With the exception of the few producers of low phosphorus ores the mines in the Bessemer agreement have come considerably short of marketing the amount provided for originally.

Pig Iron. One prominent producer of pig iron has closed more business in the past month than in the three months preceding. The activity noted in the past two weeks continues and is chiefly in foundry iron. Where $10 at furnace was received for No. 2 iron six weeks ago, $10.40 is now the basis, and with other sellers $10.50 and $10.75 is the range of quotations. Some business has been done for the first half of next year, but in the main deliveries under current buying stop with Jan. 1. Holders of Bessemer iron are quoting $11 at furnace as a minimum, and speculative inquirers have found that figure inflexible in nearly every case, though a transaction for prompt delivery is reported at $10.75. A sale has been made from the valleys for malleable use in Cleveland. Gray forge is no longer offered at the low figures of a month ago, and Northern and Southern are close together, with less of the former on the market of late. The 65 per cent freight rate out of the valleys, instead of 75 cents, to Cleveland and Ptsburgh, is effective to-day. Lake Superior charcoal iron is more active. We quote:

Bessemer	11 75	Valley Scotch No 1.	$11 75
No. 1 Strong Foundry	11 50 @11 75	Valley Scotch No. 2	11 25
No. 2 Strong Foundry	10 75@11 25	Gray Forge	9 50@10 00
No. 3 Foundry	10 25@10 50	Lake Superior Charcoal	13 50

Finished Material A Central Ohio agricultural concern is in the market for season requirements and another implement inquiry is up, calling for a considerable tonnage of steel. The contract has been let for a new West Side block, calling for 150 tons of steel. Here and there a disposition appears to do business as though the election result were known, but this is the exception as yet, though in all lines the feeling is better and confidence is growing. Local mills are all running in part and expect to remain active just to the extent that orders require. A sale of billets by one rod mill to another is significant of the character of a number of the transactions in steel. Some of the smaller wire nail establishments in Cleveland have been arranged with by the pool, but there is still a goodly number of machines outside. We hear of low prices on plates and sheets, but no changes otherwise. Quotations are: Beams and channels, 1.65c; angles, 1.20c to 1.25c; bar iron, 1.20c; steel bars, 1.15c; tank steel, 1.20c.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1142 MONADNOCK BLOCK, Sept. 30.

Transactions were considerably more numerous in the past week and while no large sales of material have been made, the aggregate is a little in excess of the week previous. Inquiries are also more numerous but a large number of the prospective buyers are not expected to place their orders until after election. The market generally is in better condition than it has been for some time and the indications point to a very large business after election, if sound money wins. There is also considerably more confidence in the outcome of the election, and as a consequence buyers are feeling very much easier and are more inclined to consider making large purchases.

PIG IRON.—A considerable business was done last week, the bulk of it in small lots. The larger part of the business was taken by the Northern furnaces, whose sales aggregated quite a little larger tonnage than that of the week before. A fair business was done in Southern iron, all of it in small lots. Prices of Northern iron are being firmly maintained. Prices of Southern iron are to be reduced on Oct. 1, 20c a ton by the reduction of freight rates by the lines north of the Ohio River of this same amount. One furnace company, however, has advanced its prices at furnace 25c a ton. We have changed our quotations accordingly. There has been some inquiry for iron for delivery in the first six months of next year both from Northern and Southern furnaces and on this business the furnaces ask an advance of 50c a ton over the current quotations. Quotations are as follows:

Lake Sup. Charcoal	$13 50@14 00	Southern No. 2 Soft	$10 40@10 65
Local Coke Fdy. No. 1	11 25@11 75	South'n Silveries No. 1	11 15@11 65
Local Coke Fdy. No. 2	10 75@11 25	South'n Silveries No 2	10 90@11 15
Local Coke Fdy. No. 3	10 25@10 75	Jackson Co. Silveries	14 00@16 05
Local Scotch Fdy. No. 1	11 25@11 75	Ohio Silveries No. 1	15 00@15 55
Local Scotch Fdy. No. 2	10 75@11 25	Ohio Silveries No. 2	14 50@15 05
Local Scotch Fdy. No. 3	10 25@10 75	Ohio Strong Softeners	14 00@14 28
South'n Coke No. 1	10 90@11 15	Alabama Car Wheel	16 25@16 75
South'n Coke No. 2	10 65@10 90	Malleable Bessemer	12 25@12 05
South'n Coke No. 3	10 40@10 65	Coke Bessemer	13 00@13 50
Southern No. 1 Soft	10 65@10 90		

BAR IRON.—While there is considerable inquiry for iron from both jobbers and consumers, orders have been limited to small lots. It is expected however that there will be a better demand immediately following the election. Prices are made as follows: Common iron, 1.30c to 1.35c; guaranteed, 1.35c to 1.40c; soft steel bars from strictly billet stock, 1.20c to 1.25c.

RAILS AND TRACK SUPPLIES.—A good run of small orders continues to be had, but no large business has been closed or is in sight. Prices are made as follows: Rails, $29; splice bars, 1.30c to 1.35c; track bolts with square nuts, 1.90c to 2c; hexagon nuts, 2c to 2.10c; spikes, 1.75c to 1.80c.

BILLETS AND RODS. — A few small orders were received for rods last week at $26.50 a ton. Some inquiries are had for billets but so far no large sales have been made. The quotation is unchanged at $21.25.

STRUCTURAL MATERIAL. — No large orders were taken last week and some business of considerable size that was expected to be placed about this time has been held up until after the election. The run of orders in small lots is surprisingly good under the circumstances and is an encouraging indication of future business. Prices are unchanged as follows: Beams and channels, 1.70c to 1.75c; angles, 1.25c to 1.30c; plates, 1.30c to 1.40c; tees, 1.45c to 1.50c. Small lots from stock are quoted ¼c to ½c higher.

PLATES.—No business of any size was placed last week and the small orders were hardly so numerous as in the week before. Quotations are made: Tank steel, 1.30c to 1.35c; flange steel, 1.55c to 1.60c fire-box steel, 2.15c to 5c.

SHEETS.—Business has been very light, only a few small orders having been taken. It is not expected that any large amount of business will be done for the next month. Quotations are made at 2.15c to 2.20c for No. 27 black and 80 and 2½ to 80 and 5 per cent discount for galvanized.

MERCHANT STEEL.—There is a considerable increase in the amount of business done, orders being larger and more plentiful. Prices are as follows: Open-hearth spring, tire and machinery steel, 1.85c to 1.95c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.55c to 1.65c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

OLD RAILS AND WHEELS. — Almost no business was done and no increase is looked for in the immediate future. One sale of 100 tons of old iron rails was made recently at $11.10. Prices are only nominal. Old iron rails are held at about $11 to $12, old steel rails at $7 and old wheels at $11 to $12.50.

SCRAP.—Very little business is had for any grade of scrap and prices are only nominal. The following are buying quotations furnished by dealers: Railroad forge, $8.50 to $9; dealers' forge, $8 to $8.50; No. 1 mill, $6; heavy cast, gross ton, $7 to $7.50; malleable cast, $7.75 to $8.25; axles, $11.25; cast borings, $2.75; wrought turnings, $3.25; axle turnings, $5.25; mixed steel, $6.25; stove plates, $5.25; heavy melting steel, $7.75 to $8.25.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, Sept. 30.

It is not expected hereabouts that conditions in the iron trade will change materially until after the election, and consequently there is little anxiety to push things. The exceptions to this statement are the mills that must run part time to supply actual necessities of customers, and that are continually on the alert to prolong these spasmodic runs. There is some activity in iron on speculative account. Furnaces are rigidly holding to $11.75, Pittsburgh, on standard Bessemer, and buyers are expected to come to this figure. Some sales of foundry iron are reported but there is little present activity among the foundries. Confidence is apparently on the increase and money is reported as somewhat easier.

PIG IRON.—An increase in speculative buying has caused some little stir in pig iron circles. Propositions of various kinds are going the rounds of the furnaces but meet with little encouragement. When deals are figured on, prices are somewhat stiffened. An inquiry for 2,000 tons of standard Bessemer called forth no bid under $11, at furnace. The buying of the week has not resulted from a normal demand for material. A sale of 1,000 tons of special No. 2 foundry and another of 1,000 tons of No. 2 foundry have been made, the buyers' yearly con-

tracts having expired. In mill iron we note two sales at $9.60 and $9.65 respectively. A sale of 500 tons of charcoal iron is also recorded. We hear of the purchase by a Western Pennsylvania steel works of 10,000 tons of low phosphorus iron upon which certain Pittsburgh furnaces were figuring. The sale is reported to have been made by another interest in the Western Pennsylvania district. Standard Bessemer is ruling from $11.50 to $11.75, the latter figure being closing adhered to by all furnaces not in need of money. We quote:

Bessemer	$11.50 to $11.75
No. 1 Foundry	11.50 to 11.75
No. 2 Foundry	11.00 to 11.25
No 3 Foundry	10.50 to 10.75
Gray Forge	9.50 to 9.75

BILLETS.—There is much more talk of buying billets but contracts closed are scarce and of small tonnage at best. Many good patrons of billet millets were heavily stocked just before the pool formation and will have material for some time to come. Present consumption does not deplete stocks rapidly and hence no great activity is to be expected. Sheet bars continue fairly active.

STRUCTURAL MATERIAL.—Demand for 100-ton and 200-ton lots of structural shapes keeps a fair working average of business. Requests for estimates abound but are being held in readiness to move after election. One mill reports a decidedly better showing during the last few days, with considerably enlarged inquiry. Naturally in present conditions prices are extremely flexible and are materially affected by the status of mill schedules. We continue to quote as below: Beams and channels, 1.55c; universal plates, 1.15c to 1.20c; angles, 1.15 to 1.20c; tees, 1.35c to 1.40c; zees, 1.30c to 1.35c.

BARS.—Considerable railroad buying has taken place during the week. The material was required for both repairs and new construction. We also note a sale of 350 tons of special grade material which also went to a railroad. Agricultural wants have not been filled yet, although inquiry is on the market. We quote: All muck bar iron, 1.20c to 1.25c; common, 1.10c; Youngstown and Cleveland, 1.20c; steel bars, 1.05c to 1.10c, at maker's mill.

WROUGHT PIPE.—The demand for pipe is almost totally lacking during the political uncertainty. No effort is made for business as mills are confident that cost must be shaded in order to get business.

PLATES.—Last week's increased demand for plates has not been sustained and the trade has lapsed back into almost complete lifelessness. Small lots come in regularly but do not run into tonnage very fast. The locomotive requirements mentioned some time since have finally been taken from a local mill. Prices are being cut freely in competition. We quote: Tank, 1.15c to 1.20c; shell, 1.25c to 1.30c; flange, 1.35c to 1.40c.

SHEETS.—A stiffening in the price of sheets is noted in some quarters but is not the result of enlarged buying. Purchases are for temporary wants alone and mills are not running with any regularity. Prices prevail as follows: No. 26, 2c; No. 27, 2.05c to 2.10c; No. 28, 2.15c to 2.20c. Galvanized are only in fair demand.

OLD MATERIAL.—In the absence of any transactions, we continue quotations: Old steel rails, $12 to $12.25; old iron rails, $14.50 to $15; coil springs, $13; heavy melting stock, $11 to $11.40; heavy hammered iron axles, $20; rolled, $16 to $16.50; cast scrap, $9.50; wrought, $11.50 to $12; old car wheels, $11.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Cincinnati. The revival of confidence is no longer confined to spots. Every one and all sections are beginning to feel that the period of apprehension has gone by, and that preparations should be made for a return to normal conditions. Pig iron is generally one of the first articles to feel the change in business conditions, and certain premonitory signs have appeared that give hope to those interested. Furnaces have continued to blow out, production has constantly decreased, and a bottom in prices has been reached, lower than which none could go and keep the sheriff away. Another Tennessee furnace stopped last week. There is to-day a greater readiness to buy at the quotations which are up 50 cents per ton, than when they were at the bottom. It seems reasonable that the few producers able to operate should only sell at a fair margin. They are not more than keeping even now, and some are still losing. One of the prominent Alabama companies has announced its determination not to sell except at 25 cents per ton further advance. Sales have been considerable in the Central West. Several round lots of Northern and Southern irons have been bought by implement and machinery men, and a number of other deals are under way. Reports continue to be published of greater activity among mills and foundries, but careful investigation over the entire iron consuming portion of the country, shows little enlargement of consumption. It will come in due time. We quote as follows: Southern coke, No. 1 foundry, $9.75 to $10; No. 2, $9.50 to $9.75; No. 3, $9 to $9.25; gray forge, $8.75 to $9; mottled, $8.75 to $9; No. 1 soft, $9.50 to $9.75; No. 2 soft, $9.25 to $9.50; Lake Superior coke, No. 1, $12 to $12.50; No. 2, $11.50 to $12.

Philadelphia A better demand for pig iron at fair prices is reported. Sellers are holding standard brands firmly and buyers are placing orders for near-by requirements. The tendency of prices is evidently upward, and the size of the advance asked on forward deliveries confines trading pretty closely to the immediate future. Consumers have very light stocks and it is quite certain that demand for early consumption will keep up steadily through the balance of the year. We quote: No. 1 X foundry, lake ore, seaboard, $12.50 to $12.75; No. 2 X foundry, lake ore, seaboard, $12 to $12.25; No. 1 X foundry, seaboard, $12.50 to $12.75; No. 2 X foundry, seaboard, $11.75 to $12; No. 2 X Southern, $11.25 to $11.50; No. 2 plain, seaboard, $11.25 to $11.50; standard gray forge, seaboard, $10.75 to $11; ordinary gray forge, seaboard, $10.25 to $10.50. There is no noteworthy increase in the working time of mills. Three or four days a week are done by some; but there is no large business, and the more important buyers expect to wait until November. There is close competition on some orders, particularly on angles, plates and bars. The indications are that October will be a very quiet month.

THE IRON TRADE REVIEW

DEVOTED TO IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES.

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AFTER THE ELECTION.

Thus far the year 1896 has been marked by political surprises and industrial and commercial disappointments. More changes are possible in the five weeks that will elapse before election day; but from this point of view there seem to be few chances that anything but the expected will happen on Nov. 3. It would appear from the best information obtainable that the uncertainty has now narrowed down to the number of States over and above those necessary to secure 224 Electoral votes, that will be found in the sound money column. The business world, with a caution that comes of previous disappointments and, in some cases, of the opinion that five more weeks of inactivity is not a high price to pay for absolute certainty, has begun to anticipate the result that every week in September has made surer. But it recognizes at the same time that the triumph for sound money may be either of two sorts. There may come a sweeping victory that will dispose of the free silver heresy for a generation, or there may be the victory of a fair margin in the Electoral College, and perhaps a good majority in the House, with a Senate doubtful on the money question, and likely to oppose a bill increasing duties. The business world knows well that such a victory would only mean four years more of recruiting for a renewal of the fight for cheap money in 1900. And if the shadow of such a contest is to hang over the country for the next four years, it need not be said that whatever revival comes will not be broad and deep and stirring, but partial and superficial.

Whatever the size of the majority for protection and the present gold standard, the problems of the currency and of adequate revenue will remain to be solved. As to the latter, which will be the more immediate and pressing, the chief element of uncertainty is the power that will be wielded in the Senate by those who were unpatriotic enough early in the present year to refuse to provide adequate revenue for the Government, and at the same time to withhold from the Executive the power to issue bonds to maintain our financial integrity. When the present campaign is over, it may appear that the co-operation of the sound money men in both parties against the common enemy will open the way for like co-operation in the Senate, regardless of party lines, on any urgent measure that involves a way out of the Treasury's entanglements. There may be a greater complication on the tariff, but we shall scarcely look to see the humiliating bond and revenue performance of the last Senate repeated.

What industry and trade may expect in the way of repair to our monetary system, when that problem shall be seriously taken up in Congress, is quite beyond the possibility of forecast. The gold movement will naturally engross attention in the coming year. The inflow that is now bringing relief to the strained money situation will probably not continue many months longer, and in the spring a renewal of exports may be expected. It is not to be overlooked in this connection that what has served to intensify our money troubles in the past three years, namely, the sale in this market of millions of American securities that had been held abroad, will prove a feature of strength in the period of recovery. The interest on these stocks and bonds now remains at home and as confidence returns many such securities will be bought back and thus bring a return of the gold that has been going from us. Moreover, should this Government make plain its purpose to compete more aggressively hereafter for European gold, by selling its bonds abroad for coin to be used in refunding operations and in retiring Treasury notes, the way for international agreement on silver might open more speedily than now seems likely. But this is a matter of the remoter future.

It is rather the immediate effects of an emphatic verdict against free silver that have absorbed attention of late. The number of transactions that have been put off until after election, even in the last three months, is legion. Buying customs of years have given way to the compulsion of this extraordinary campaign. In many cases the trade that has been postponed will be entirely lost because the proper season for it has passed, and the seller will have to hope for compensation in larger business for 1897. The fact that the election verges on the usually quiet months of winter is also against a quick expansion in certain lines. But it may be confidently expected that, though a feast may not immediately follow the famine, furnaces and mills and foundries will see a marked quickening in November. Leaving out of the account new enterprises, many of which may wait until spring, there is a great volume of business of an ordinary replenishing character that must be placed just as soon as the result is known. None know better the completeness of the interruption to routine and presumably necessary buying than traveling salesmen. For weeks they have been repulsed with the emphatic declaration that no new obligation would be assumed "until after election," and almost as frequently they have had the positive assurance that with free silver buried, the long postponed order would be given.

It has long been apparent that the free coinage of confidence is the great need of the country today, rather than the unlimited coinage of 50

cent dollars, and once that confidence comes, that departed in the late months of 1892, the stream of trade should flow out into broader channels and credit be restored to something like its normal proportions. Meantime there is no lack of appreciation in all commercial and industrial lines that the more crushing the defeat of depreciation and repudiation, the quicker and greater and more sweeping will be the revival so impatiently awaited.

SOME POOL RECORDS.

There have been good opportunities, in the past year, for a study of the methods and the results of combines in the iron and steel trade. On Bessemer ore, steel billets, beams and channels, bar iron, hoop iron and steel, shafting, and wire nails and cut nails, prices have been fixed for a number of months by agreement among producers, some of the arrangements extending back into 1895. We leave out of the account the steel rail pool, which has won a title to permanence by years of wise and conservative action. As to the probable duration of the other arrangements, there has been a variety of expression. Some sweeping attacks have been made on all the pools, and a short life has been predicted for each in turn. These predictions have been based on the general proposition that pools help to build up new competition which cuts the market and compels eventual retaliation by the original producers, leaving the last condition of the market worse than the first. Another reason for asserting that combinations will be but temporary is that this has been their history almost universally. A third reason for expecting collapse is that time accentuates the diversities of interest in a pool membership, that considerations of mutual interest may suppress temporarily.

It is true that the billet pool and the nail pool have stimulated an increase of producing capacity. The former has made competitors of some who were formerly customers. Owing to the large investment involved, the condition of the money market, and the relatively larger call to-day for open-hearth steel, it has not led to the building of additional Bessemer plants; and in open-hearth but two plants are under way that can be traced directly to the advance in price made by the pool, though it is certain that other projects will be pushed after election. Thus far no signs appear pointing to a dissolution; on the contrary, since the appointment of a committee to handle grievances, the organization has given greater promise of permanence.

The nail pool, from the unreasonable extent of its advances, the misunderstandings and suspicions that grew out of a base price at which no nails of any sizes were ever sold, and its effort to control every avenue of the trade, including the manufacture of nail machines, has drawn more criticism than any other. Its rapid pushing up of prices greatly stimulated production. Manufacturers in other lines put in wire nail machines, and at the large profits possible soon paid for their machines and were thus in a position to stay in the business indefinitely. One after another of these outside concerns was bought up or arranged with, but the crop was still plentiful, and though the pool committee has been busy corraling small competitors, the outside product is still a trouble-making factor. It is a serious question, indeed, whether the burdens the pool has assumed in its various contracts with former competitors are not so heavy that collapse must come soon. The failure of repeated efforts to form pools among wire rod and wire manufacturers has aided in thwarting the plans of the pool for complete control. It was the failure to induce wire manufacturers who made no nails, to refuse to sell to non-pool nail-makers, that led the pool to its last coup—the control of the output of the principal wire nail machine manufacturers. When the collapse comes, be it soon or late, there will be a vastly increased capacity for nail manufacture over anything the country has known, and until consumption can overtake it, though demand may expand with the release of output restrictions, profits will be an uncertain quantity.

The bar iron pool has been moderate in its ideas as to price, hedged in by the competition of rolled steel from concerns having their own converters and, up to the last wage settlement, by the advances in wages that accompanied every advance in the price of iron. There has been no stimulus to the building of new rolling mills; and should the agreement be terminated—as is not likely to happen soon, with a revival in business so close at hand—there would be no trail of demoralization from new-made competition. While some permanent loss of trade may have resulted from the encroachment of cheap steel encouraged by a fixed price on bar iron, the pool has done a good work in steadying the trade and in correcting the abuse of contract violations that had grown to be a crying evil.

An expansion of business in various lines may bring developments in the conduct of the various combinations quite different from what has appeared in the past six months. But in the face of the record thus far made, no generalization about combinations is just. Each must be judged by its fruits and by the conditions that produced it.

Two of the best commentaries we have read on questions discussed in the present campaign are contained in the Sept. 20 issue of the *Bulletin*. One is Mr. Swank's admirable editorial on "The Western Farmer's Discontent," reviewing the legislation of the past 40 years in the interest of the farming community, and pointing out the real causes of the low prices for farm products. The other article is by Cyrus Elder, solicitor and general agent of the Cambria Iron Co., originally communicated to a Johnstown, Pa., paper, showing from figures taken from the Cambria Iron Co.'s books, the extent of labor's loss by the blight that has come upon American industries in the past three years. Mr. Elder makes clear that "it is the workingman's dollar that moves the whole industrial world," and argues that the "crime of 1893," and not the "crime of 1873," is the cause of the troubles that have been upon the country.

One of the most interesting articles in *Scribner's Magazine* for October is that of Miss Humphreys on "The New York Working Girl." There are portraits of many women who have been prominent in recent New York strikes, and the writer gives a good insight into the way the working girl has organized to take care of herself. "The Government of Greater New York," by Col. F. V. Greene, and "The Expenditure of Rich Men," by E. L. Godkin are noteworthy. Mr. and Mrs. Blashfield give an account of the artistic and historical attractions of the famous Italian city Siena, elaborately illustrated.

MANUFACTURE OF WROUGHT IRON.

We take the following from an interesting paper read by Mr. James Kerr, before the West of Scotland Iron and Steel Institute. The writer was a puddler for eight years and has been connected with wrought iron manufacture for many years. He takes the view that, contrary to the generally expressed opinion, there has been a change for the better in puddling mill practice, and a lightening of the puddler's labor. At the outset he gives some details of the practice of 25 and 30 years ago:

The regular charge was 4 cwt. 1 qr 20 lb., or 4 cwt. short weight, and the output per shift of six heats was about 22 cwt. to 24 cwt., according to the quality of pig iron used. The consumption of fuel averaged about the same as the charge. Besides having to puddle his six heats, the puddler in those days had to break up 10 cwt. or 12 cwt. of "bull-dog" for fettling, besides two to three cwt. of "blue billy," and also wheel in any light iron he might require Altogether it was usual to work 13 to 14 hours for six heats, and for a produce of 22 cwt. to 24 cwt. I might also mention that the common practice was to drag the puddled balls along the plates to the hammer, the fore-hand or under-hand swinging it on to the anvil, when it got one blow and was then turned up and got a second blow. It may be a surprise to most of you when I say it was a very common practice to compel the men to get six heats per shift before stopping, so that it was no uncommon thing toward the end of the week for the day shift puddler to commence work at 12 o'clock noon instead of 6 A. M., and on the Saturday finish at or near Sunday morning.

Puddling as carried on to-day is different. The furnace itself is not much altered—only a little larger; but the grate is entirely closed up, and dross (mostly washed) is used with forced blast either by steam jet or blower, the single furnace being used for steam raising by attaching a double flued Lancashire boiler. A cheaper and better fuel is thus used, and much less of it. The result of this is that puddlers now charge 5¼ cwt. to 5½ cwt. short weight, and work six heats easily in 12 hours. They do not now require to break "bull-dog," because it is not used. In its place superior fettlings are used—ball furnace tap, pottery mine, hematite ore, cinder tap reduced in a special furnace from scale, purple ore, etc. These being all much higher in iron, a less quantity is required, and the puddler gets them all delivered to him at the furnace. He does not now require to leave his furnace to go to the hammer and place the puddled ball on the anvil; by arrangement with the shingler, the latter now does this. Puddling is considered by some a very laborious job, but it need not be so. Any intelligent man by the exercise of reason can lighten it considerably. Speaking from my own observation during the last 25 years, although iron manufacturers have been blamed for making no effort to improve either the process or the economy in working, I may say that during those years the produce of the puddling furnace has been increased by about 30 per cent for less working time, for a less amount of labor and expenditure of fuel, and also at a much less waste of iron by oxidation.

I will now explain the preparation of the furnace and the puddling of a heat of iron, using the terms employed by the puddler. To begin with, the furnace bottom is first prepared by oxidizing light iron, the oxide acting as a protection to the bottom plates. Fettling, of the kinds I have already mentioned, is then placed around the sides, and the whole forms a hollow cavity not unlike a basin. From 56 to 84 lb. of hammer slag or roll scale is then thrown in, and the pig (generally a special mixture which from experiments has been found to give good results) is thrown round the bottom. The average analysis of a heat of pig iron may be taken as:

Carbon, combined and free	3.98
Silicon,	2.13
Phosphorus,	1.40
Sulphur,	.08
Iron (by difference)	92.41
	100.00

The pig iron is, of course, in half pigs, and it is at the melting stage that the puddler, by paying attention, can save himself a great deal of extra work and much loss to the manufacturer. If he is not careful to see that his iron is melted uniformly, but allows some of it to be exposed unduly to the fire, it drops at once onto the bottom, and melts the oxide off the plates. Supposing the heat is now uniformly melted, the hammer or roll scale floats on the top, and prevents it from being burned. The puddler is understood to have been working the iron from the time the pigs first commenced to melt, and he gradually increases the agitation as the iron becomes liquid.

It is now at a sufficiently high temperature, but he still continues the agitation, and when he thinks the iron is sufficiently heated he puts on a small fire, with the object of dampening the furnace, and puts down the damper, thus lowering the temperature. Still he agitates till the metal becomes pasty with the lowering of the temperature, and when sufficiently thick the damper is raised, and the temperature again increased. At this stage the iron mixes with the cinder, and it is now on the boil, and appears for the first time in a semi-malleable form and in granular parts.

It is now boiling rapidly, and some impurities in the form of cinder flow over the fore plate of the furnace, owing to the increased bulk. It is now that the puddler requires to keep up the agitation, to prevent it from sticking to the bottom and sides of the furnace. As it increases in temperature the cinder becomes thinner, the iron ceases to boil, and settles down, or, as the puddler says, "drops," and is then in a soft, spongy mass, and requires to be well and unifomly turned over and exposed to keep it at a regular heat all through. It is in this state that loss by oxidation may take place through exposure to cold air rushing through the stopper hole.

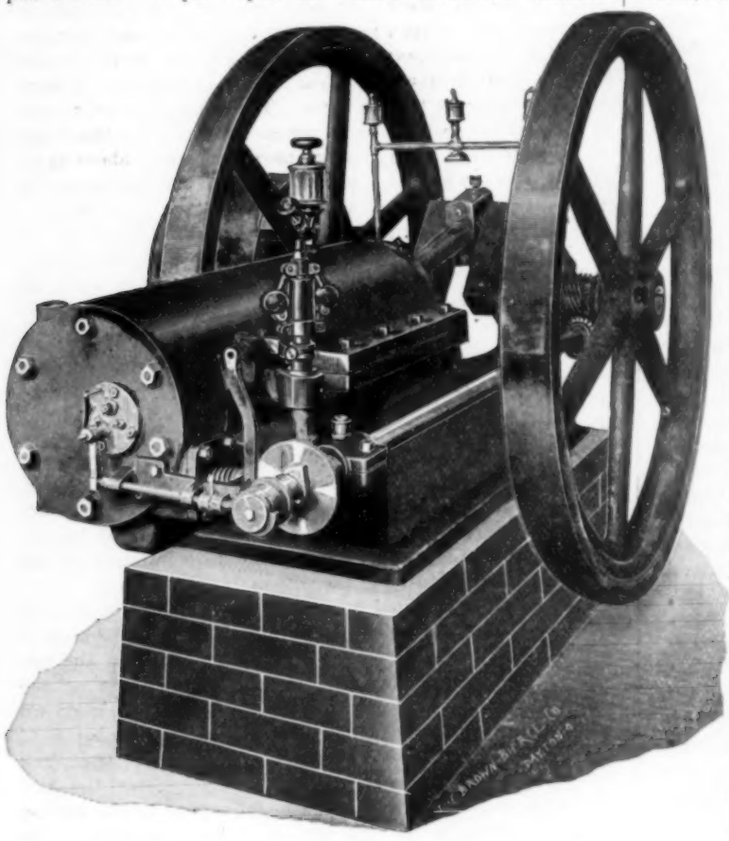
The puddler now balls it into four or five balls of a little over one cwt. each, and takes them one at a time to the hammer, where any cinder now in it is hammered out, and the balls are finished in square or flat slabs and sent to the forge rolls. They are then rolled into puddled bar. The further manufacture into finished iron is merely mechanical, and I do not propose to deal further with it, as every manager has his own method of piling, etc., to produce marketable bars, but will deal shortly with quality. Twelve or 13 years ago, any one who ventured to express an opinion that malleable iron was not doomed to be totally superseded by steel, would have been laughed at. Experience has proved, however, that while iron has been superseded to a great extent for shipbuilding and other large structural work, it is still in demand for general blacksmith work, horse shoes, chain and cable iron, tubes, hoops, etc. Although steel has developed locally to an enormous extent, still, in this district, at the present moment, there is a greater output of malleable iron than there ever was.

Now that we know the worst in connection with steel regards its effect on the consumption of malleable iron, I think malleable iron works managers, by applying themselves to the subject, might raise the quality of iron and actually re-take some of the orders which are now taken in steel. I have an opinion, for instance, that an iron retaining all the good points of malleable iron, and more nearly approaching steel in strength, elasticity and homogeneity, would find a ready market. I think I am correct in assuming that a breaking strength of about 23 tons is considered as high as iron can go and still retain its good points, although I am aware that iron for a special local contract has been specified by the engineer and has been supplied at 24 tons tensile strength. I have been experimenting myself in this direction, and I propose to submit a sample of puddled bar iron. The pig iron used was Cleveland, and the lowest quality that is used, I think, in this district in the manufacture of malleable iron, and it was puddled under my own supervision, and in the type of furnace and in the mode I have described. The puddled balls after being hammered, were rolled into three inch puddled bars, and I have here a common break test, and I have also a test made by reducing a sample to 7-8-in. diameter, and testing it in an ordinary testing machine, which any one interested can see. The breaking strain at the moment of fracture was 27.7 tons. I am not quite prepared to say how this result was obtained, but I leave the l hint with works managers. So far, this is the best result that I have got from malleable iron, but it has not yet been fairly tried to ascertain what prospect it has of commercial success. I have great hopes of it.

BROWN GAS AND GASOLINE ENGINE.

The features of the Brown gas engine, a view of which is given below, are its small number of parts and the avoidance of devices that are likely to get out of order; the possibility of changing from gas to gasoline without stopping the engine; the avoidance of compression and the making of the electric spark only when needed; the possibility of changing the speed while the engine is in motion and the runnng of the engine over or under, as may be required; and close regulation by means of a sensitive governor.

On the first outstroke of the piston the cylinder is filled with gas and air, mixed in the proper proportion, and upon the return stroke this mixture is compressed, and just as this stroke is being completed the electric spark is made within the cylinder, which ignites the mixture, causing the explosion to take place, forcing the piston on its second out-stroke. As this stroke is being completed the piston uncovers a port allowing the burnt gases to escape, and just before the piston closes this port upon the return stroke the exhaust



valve is opened, allowing the piston to empty the cylinder of burnt gases at the completion of the second in-stroke.

The exhaust valve is seated under the pressure of a helical spring strong enough to resist suction of the piston and on the out-stroke a fresh mixture of gas and air is again drawn into the cylinder, and this cycle of operations is repeated until the speed of the governor rises above normal. Upon so doing the governor will operate upon the exhaust valve in such a manner as to prevent it from seating, and at the same time operate upon the igniter in such a way as to prevent the electrodes from being brought into contact, thus saving the batteries and the electrodes from unnecessary wear.

The governor, by preventing the exhaust valve from seating, leaves an open passage from the cylinder to the atmosphere. This passage is large enough so that the out-stroke of the piston will fill the cylinder with air drawn in through this passage without raising the mixture valve, and upon the return stroke this air is forced out through the exhaust port which is being held open, thus avoiding useless compression. This operation is repeated until the speed of the governor returns to normal, allowing the exhaust valve to seat and the igniter to operate.

The engine is so arranged that it can be operated by either gas or gasoline; change can be made without stopping the engine or missing a single explosion, the engine taking the gasoline direct from the supply tank which is located below the inlet of the engine, or the supply tank may be placed entirely away from the building, underground, and by using a specially designed pump, bring the gasoline to the engine, allowing the surplus to return to the tank.

The engine can be changed in five minutes, it is stated, to run either over or under, saving cross-belts and special settings. Before leaving the factory it is customary to have each engine run several days on both gas and gasoline. Indicator cards are taken and from the tests the horse power of the engine is rated and guaranteed. The engines are built in sizes from 3 to 50 horse power. The manufacturers are the Brown Gas Engine Co., successors to Martin Schneble Sons Co., Dayton, O.

Received from the Trade

A mammoth catalogue, and one quite as noteworthy for other things as for size, has been issued by the U. Baird Machinery Co., of Pittsburgh. It is substantially bound in green cloth, lettered in gold, and is of standard size, the pages being 9x12 inches. In the size of its page and in thickness the book closely resembles the original editions of the Encyclopedia Britannica. There are 650 pages and more than 1,750 illustra tions of machinery. The index to the machinery catalogued occupies 11 of the broad quarto pages. Beginning with engine lathes and running through speed, turret, chucking and monitor lathes to the extent of 60 pages, the whole range of machine tools and iron and wood working machinery is traversed, with a well-nigh endless list of sizes and varieties. Machine shop, iron and brass foundry, forge, pattern shop, metal working and wood working equipment is described with much detail of construction and adaptation. Thirty pages at the last of the volume are devoted to practical rules and formulas and other informatoin of great value in shop operations, including rules on gearing, formulas for determining dimensions of small gears by diametral pitch, chart for grinding lathe tools, emery wheel speeds, weights and measures, weights, measurements, etc., of cast iron pipe, bar iron and sheets, with standard sheet metal and wire gauges, dimensions of structural material, etc. In the descriptions of machinery each page is complete, so that reprint sheets may be used as handy leaflets. A double edition is issued, the smaller being a photographic reproduction of the larger, handsomely bound and printed on enameled paper. The catalogue is one of the most valuable and most creditably made that has come to our table.

Rogers, Brown & Co., have published a card folder showing the electoral vote by States and candidates in 1892, with blanks for the vote of 1896. On the fourth page are interesting statistics—the production of gold and silver in the world since 1880, prices of silver and wheat since 1890, and June prices of pig iron for six years.

THE suit of the Carbon Steel Co. against the Carroll-Porter Boiler Co. for $2,500 balance on steel furnished, was tried at Pittsburgh last week. The plates were purchased to make a receiver to be used in a hydraulic apparatus at mines in Mexico. The receiver burst and the company refused to pay for the steel claiming the quality was inferior. Witnesses for the steel company testified that the Carroll-Porter Co. had ordered plates made of common tank steel. It developed that the company ordering the receiver from the Carroll-Porter Co. had specified flange steel. John Porter, of the defendant company, admitted that it had ordered tank steel to make the receiver, but had furnished a plate for a test and it had stood it. A verdict for $2,685.20 was rendered for the plaintiff.

THE receiver of the Champion Steel Ore Co., of New Jersey announces elsewhere the sale of the company's property on Oct. 9. The company has a lease of 122 acres of iron ore lands in Oxford township, Warren Co., N. J., about a mile from Oxford, and an equipment of mining machinery. The Champion mine produces Bessemer ore, and while the mine was being developed 7,000 tons was used by the Bethlehem Iron Co. The receiver is J. R. Encke, of 344 Bond st., Trenton, N. J.

MR CARNEGIE ON OPEN-HEARTH EXPANSION.

A recent article by Andrew Carnegie, in the *Engineering Review and Metal Worker*, of London, touches on two questions of immediate interest to the iron and steel trades in the United States—the low rate of railway transportation in this country, as compared with England, and the rapid growth in the United States of the open-hearth steel process. Particularly interesting are Mr. Carnegie's references to the low cost of ore freight expected from his new railroad, and his statement that a lower demand for Bessemer ore is likely, citing the open-hearth developments in the Pittsburg district in illustration:

"More than one railway in the United States chiefly devoted to this traffic and free from costly limited passenger trains, with dining and sleeping cars, etc., attached, have found that mineral traffic can be profitably carried at three mills per ton per mile. One of the foremost railway presidents, who has risen from the ranks, and still looks after the practical management of his great system, has stated that "he can make all the profit he ought to make upon such traffic at three mills per ton per mile." But even this hitherto low rate is no longer confined to minerals. Finished steel has been transported from Chicago to the seaboard—1,000 miles—at three mills per ton per mile, or less than one-sixth of a penny—about seven miles for a penny. Of course, it costs no more to transport finished steel than raw ironstone, if both are loaded and unloaded by the shipper at the shipper's works and piers, and this is a fact that requires to be more fully realized in England.

"We have recently undertaken to get a new line of railway from Lake Erie to Pittsburg—say 150 miles—partly by using an existing line, and adding to it some 40 miles, in order to bring it to Pittsburg. This line we intend to devote exclusively to mineral traffic, carrying Lake Superior ironstone from the lake to Pittsburg, and coal in return, to the lake; limestone, also, which exists in large quantities along the line, will be transported by it. If three mills per ton per mile upon this traffic does not pay we shall be disappointed. This low cost is obtained by using 40 or 50 ton eight-wheel dumping cars—weighing, say, 15 tons; a thousand ton freight to be drawn by each locomotive, with only four trainmen,—engineer, fireman, conductor, and brakeman—the engines and cars of course, being equipped with the air brake. Heavy rails and low grades are provided for.

"Anthracite coal in large quantities, used in Western cities, has been carried for years at three mills per gross ton per mile. But these rates hitherto have been considered exceptional. As I read the future, they are to become general, and to apply, not only to raw materials, but to finished materials as well, provided the latter are furnished in car loads or train loads, as mineral traffic is, and the railway company has only to haul the cars, having to provide neither yards nor depots, nor to load or unload.

"This coming revolution in rates is certain to work some changes in the points of manufacturing, but Pittsburg, being the center of consumption, with power to spread its wings in all directions—east and west, north and south—is to be most benefited by the lower rates.

"The second unusual movement in the conditions of manufacturing in the United States is the rapid growth of the open-hearth process in the making of steel. Engineers are now all specifying open-hearth steel. It is impossible to sell Bessemer steel for bridges, boiler plates, ships, or even for those enormous 22-story steel structures which are going up throughout the country. Open-hearth steel is now sold almost if not quite, as cheaply as Bessemer. This is rendered possible by the lower price of the Mesabi and non-Bessemer ores of Lake Superior than of ores necessary for the Bessemer process, these ores being suitable for open-hearth practice. If the movement continues we are likely to see less demand for Bessemer ores, and therefore the tendency will be for the Bessemer and non-Bessemer ores to become equal in price, and this may give the Bessemer steel a slight advantage in the cost. If so, it will continue to be used for billets and a thousand and one ordinary purposes. But there will still remain a large market for the open-hearth variety. So confident is one of the leading concerns in the United States of this, that to-day it is erecting 16 40-ton open-hearth furnaces, having already 20 in operation, so that this concern will have 36 open-hearth furnaces capable of producing 90,000 tons of open-hearth ingots per month—say about 1,000,000 tons per year. This shows wonderful confidence in the market for open-hearth steel. It is but proper to say, however, that this concern has large interests in Mesabi ores, and has also command of very cheap gas coal as well as of natural gas, which is found to be remarkably well adapted for open-hearth practice."

LAKE SUPERIOR IRON MINES.

The Minnesota Iron Co. directors decided this week not to pay the dividend of one and one-half per cent due Oct. 15, on account of the depression in the iron trade. The company has paid dividends so far this year of one and one-half per cent April first and one and one-half per cent July first. Previous to that time the company had not paid dividends since 1893. It is hoped to resume dividends after the election.

With Oct. 1 a slight reduction in wages will be made at the mines of the Lake Superior Iron Co. and the Cleveland-Cliffs Iron Co. at Ishpeming, Mich. At both properties a reduction in force was made some weeks ago, and there is nothing in the market to warrant operation on the present scale; but it is hoped with the slight decrease in wages to keep the men now at work employed for some time to come. The new basis for miners on contract work will be $1.70, instead of $1.80; but this is not the wage earned. Many miners have gone well above $2.50 and the average has been over $2 a day. Mechanics will be reduced five cents a day and common labor from $1.30 to $1.25 a day. Both companies have large stocks of unsold ore on hand as well as considerable amounts of charcoal pig iron. The Cleveland-Cliffs Co. has about 500 men now at work, all told. Its shipments of ore will continue for about five weeks longer.

A slight reduction of wages, averaging about three per cent, will be made by the Republic Iron Co. on Oct. 1. Wages of surface workmen remain the same.

Idle mines on the Gogebic range are the Norrie, East Norrie, Pabst, Brotherton, Comet, Tilden, Anvil, Mikado, Germania, Windsor, Odonah, Iron Belt and Atlantic. Only the Palms, Newport, Aurora, Ashland, Sunday Lake and Montreal are active. Between 5,000 and 6,000 more men would be employed on the range to-day had operations continued at the rate of the early portion of the season.

The discovery of a new lens of ore at the Chapin mine was referred to in these columns some time ago. The work of cross cutting to this ore from the Hamilton shaft on the one side and from the 9th and 10th levels of the Chapin on the other side is now going on rapidly. Much of the ore is known to be of Bessemer quality and it is believed the new lens is of large extent. Mineral Commissioner Newett, writing in *Iron Ore*, says: "The discoveries at the Chapin within the past year have shown that there is excellent chance for the finding of ore anywhere in the rich jaspers of this formation. The new lens on the north indicates this, and the lenses worked by the Millie mine upon the south, is further proof of the richness of this formation in ores of merchantable quality. There is still a considerable territory upon which nothing has been done and lying within the limits of the limestone."

THE board of managers of the Joint Traffic Association has decided to maintain until Nov. 30 the lower rates on iron articles, by which fifth class freight went as sixth class, etc. These rates, which were made in April, are ordinarily changed to the regular classification with Oct. 1.

EVERY department of the Pueblo, Col., steel plant of the Colorado Fuel & Iron Co., about which reports of a general shut-down were recently circulated, has resumed full operation.

THE Braddock Wire Works, at Rankin, Pa., will resume in full next week, after being idle since early July. The Duquesne Forge Co., also of Rankin, has started its machine and hammer shops.

A RECEIVER has been appointed for the Buffalo (N. Y.) Drop Forging Co., incorporated in 1891. The inventory of Jan. 1 last showed assets of $58,000 and liabilities, $19,000.

TROUBLES OF THE TIN PLATE TRADE.

We do not know what reasons, if any, there have been for the continued assertions that American mills have a capacity to produce all the tin plate required by this country, barring that which naturally will come from abroad as long as the duty is refunded on its re-export under the drawback system. Whatever these reasons may have been, we are certain they can have no weight in comparison with the loss sustained by American makers owing to their product selling at lower rates than foreign tin plate of similar grade sells for in the same market, a loss which amounts to hundreds of thousands of dollars a year.

Since the beginning of this year no important increase in our productive capacity has taken place, yet the figures of the Treasury Department show that up to August 1 there were imported into this country 179,386,938 pounds of tin plate, which is at the rate of considerably over 3,000,000 boxes of 100-pound plates per year. Stocks were very much less on August 1 than on January 1, but we will let that go. Whatever portion of that 3,000,000 boxes is not used for re-export under the drawback system, or imported on the Pacific Coast is being brought into this country from Wales to supply an American demand which American tin plate mills fail to supply, and that portion is fully one-half of the 3,000,000 boxes a year. The latest official figures available as to the amount of tin plate on which the duty was rebated cover the fiscal year ended June 30, 1895, a better year than the last, and the total is 126,777,800 pounds. Up to the first of the present month, the Standard Oil Co., the largest concern which re-exports tin plate, had imported about 127,000 boxes, or at the rate of 325,000 boxes for the full calendar year. To the amount of tin plate re-exported with the drawback must be added the tin plate which is imported on the Pacific Coast, deducting, however, something for that which is imported there and re-exported, with drawback, because a considerable portion is thus re-exported, and that part is already counted in the 126,777,800 pounds. Besides this, some tin plate is shipped by rail from American factories to the Pacific Coast. The total consumption of tin plate on the Pacific Coast is less than 50,000,000 pounds annually, so that we should be perfectly safe in allowing a quarter million boxes for this item, bringing the total American tin plate consumption now out of reach of American mills to 1,500 000 boxes a year, and subtracting this from the 3,000,000 boxes mentioned as the rate at which we are importing leaves 1,500,000 boxes a year as the amount which is being brought over to supplement American production. The trade is in such shape that there is no inducement to capitalists to erect more tin plate plants, and there are no indications of new enterprises in that direction, so that it is safe to predict that these supplementary imports will continue for some time.

It is unnecessary for us to refer particularly to the exact amounts to which American tin plate has been underselling the foreign article. The difference was not so great during the last two or three months as it was last spring and winter, but present indications are that it will increase and that if nothing is done to change the conditions the difference in selling price between domestic and foreign plates will be at least as great this winter as it was last. Twelve months ago the wholesale price of full weight I. C. coke plates in New York was $4 a box. Since then both foreign and domestic plates have become cheaper in the wholesale market, but the remarkable fact confronts us that the small consumers all over the country, who use large quantities of tin plate, though their individual buyings are small, have secured little if any reduction. They are paying about as much for their tin plate as they did when the wholesale price of both foreign and domestic plate was much higher. In these circumstances it becomes evident that the American tin plate maker is suffering a loss from his supposed inability to reach directly a consuming market. We have shown that this market exists, and that it is large enough, and it is therefore not clear why a higher margin should now be earned by those who distribute wholesale lots of tin plate to the smaller consumers than was the case a year or two ago. We long ago pointed out that the tin plate manufacturing business was essentially a jobbing business; that it was not to be conducted in the same manner as the steel billet business, for example, where the consumers are small in number. An insufficient recognition of this principle, or a supposed inability to carry it out, has led the tin plate manufacturing business out of its proper channel, and has resulted in manufacturers coming to believe that they were dependent upon large buyers and general agents only, and that the terms on which they sold their product were not subject to their own dictation.

One of the most fertile causes which has diverted the tin plate trade from its proper channel, which we believe leads from the manufacturer direct to the consumer or small distributor, has been the desire on the part of manufacturers to start their plants into full and continuous operation immediately on their completion. To secure the needed orders it has been necessary to go to those who were willing to buy in large quantities. The sale of the mill's whole output for a period of from one to three months has been the maker's prime object; the securing of the right price a secondary consideration, in the expectation that later on better prices could be gotten and the output turned into more favorable channels. But these hoped for changes were not made. The result of this effort to start plants into full operation immediately on their completion has been bad for the owner of the plant, and has in most cases injuriously affected the whole tin plate trade. The history of the trade for some time past, has been little else than a succession of such disturbances.

In referring to mills selling tin plate in large lots we have made no distinction between those who sell "direct" and those who market their product through selling agents, because we do not believe any difference exists, except in form. The spirit of the transaction is the same in either case.

We have alluded thus plainly to this subject because the interests involved are very important, and because we believe the difficulties can be met very satisfactorily by individual action. Were drastic measures necessary, and concerted action possible, we would suggest that a period of general cessation of production each year could be readily made to advance prices to an extent greater than the loss from the temporary inactivity. * * * We do not, of course, advocate any such procedure as this, which we have outlined merely to show what good might be done by an efficient organization. What we have said before points clearly to the fact that if tin plate manufacturers can gradually divert more and more of their product into the more proper and profitable channels, they will have less to complain of as regards low prices.—[Tin and Terne.

New Publications

NATIONAL PARTY PLATFORMS OF THE UNITED STATES Compiled by J. M. H. Frederick, Akron, O., 1896. Price 25 cents.

In a pamphlet of 100 pages, the compiler has brought together the platforms of political parties in the United States from 1798, the date of the Virginia Resolutions, down to the present month and the adoption of the National Democratic platform at Indianapolis. There is considerable explanatory matter, also a list of Presidential candidates in all national elections, with the electoral and popular votes cast for each. The book presents in convenient form a large body of valuable information and as a reference work will doubtless be widely circulated.

THE JOURNAL OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION. Vol. 1, No. 1. Published monthly by the Association at Detroit, March Per Annum, $5.

This is the first issue of the monthly publication of the new National Foundrymen's Association. It contains a complete report of the national convention of foundrymen held in Philadelphia in May, and of the June meetings of the Western Foundrymen's Association and of the Foundrymen's Association of Philadelphia. There is also a digest of foundry articles appearing in the trade journals in July, and a list of members of the National Foundrymen's Association. The Journal is magazine size and the initial number contains 172 pages.

THE first canvass of the wage situation, as determined by the selling prices of bar iron and sheets, was made Saturday, Sept. 19 by the officers of the Amalgamated Association and Secretary Jno. Jarrett of the Sheet Manufacturers' Association, and Jas. H. Nutt of the valley Bar Iron Manufacturers' Association. There will be no change.

COMPRESSED AIR AS A HOISTING POWER IN THE FOUNDRY.*

BY GEO. A. TRUE.

So much has been said and written upon the general uses of compressed air as a distributing power, that it will be unnecessary to consider it in its broadest sense, but more can probably be gained by treating of its special applications to certain fixed duties. Undoubtedly its greatest services are of the future and we are probably but on the threshold of its greatest development. It is to be hoped that it will not be overrated by the amount of praise that has been bestowed upon it during the past few months. Paper has followed paper, and trade magazines and periodicals have vied with each other in their efforts to obtain new data regardng this interesting but not newly discovered power. The machine shop, boiler shop, the mine, the quarry are all largely using it. The street railways are investigating it with a promise of giving it at least a fair trial, and there are almost unlimited opportunities open for it in the domestic and li ht manufacturing field, only awaiting a public supply both of both compressed air and of a more general knowledge of its advantages as a safe, elastic and convenient power. It is of its service in the foundry, and especially as a hoisting power, that this paper will treat. But before taking up the immediate subject at hand, it will be necessary to consider for a moment the adoption of air as a principal distributing power for all classes of foundry work. So wide are its applications in this line that one is tempted to see a foundry with no steam engine other than the one which drives the piston of the air cylinder of a compressor—unless, under favorable conditions, a separate steam engine be used for the blower. If the writer were to-day installing a foundry of, say, 20 to 50 tons daily capacity, the temptation would be very strong to adopt compressed air as the only transmission power. We are not aware that such an example exists in foundry practice, and can recall but one instance where this system has been adopted as the prime distributing power by a manufacturer in any line, and that one, the Weurpel Co. of St. Louis, was unfortunately short lived and afforded but little opportunity to show what could really be done.

The power problem of the foundry, however, seems to invite a ready solution by this system. The various power units are almost invariably widely scattered, and many times must be portable, necessitating a power easily distributed over a large area. In the average foundry the fan or blower is the principal item of power consumption for several hours during the day; and the power system, if tabulated, would result somewhat like the following, taking as an example a foundry of 30 tons daily output:

Blower	20 h. p.	for 4 hours	= 80 h. p. h.
Mills and miscel. power	6 h. p.	" 3 "	= 18 h p h.
Hoisting	Average 5 h. p.	" 10 "	= 50 h p. h.

The last power item is intermittent in actual work, but the need of it extends throughout the day and calls at times for a much higher horse power than the above average, but generally a much lower amount of power is used. If the foundry is modern and progressive it will also use power for sand sifters, air chippers, cleaners, etc., and under special conditions other power machines would be desirable if air is used, when they might be impracticable under any other power system.

The predominant practice of the present time is the installation of one steam engine of sufficient power to meet the demands of the entire establishment, and the distribution is effected by means of line shafting and belts. In occasional instances electric motors are economically used for the distribution of the power. Frequently a separate steam engine runs the blower, while a system of shafting and belts attends to the balance of the equipment; but it so happens that the arrangement of an average foundry is such that power so applied is invariably on a most wasteful basis. Countershafts, clutches, bevel gears and combinations of square shafts and worm gears (on cranes especially), all running for the entire 10 hours, results in a tremendous waste of power; 50 to 60 per cent of the power is often used in turning the shafting alone, not to mention the loss resulting from the peculiar style of mechanism made necessary by the use of line shafts, and this friction loss goes on steadily throughout the day. This one item has furnished the electricians with one of their best arguments for the adoption of an electric motor system for driving the various tools and machines used intermittently, and the same claims can be advanced with added emphasis for compressed air. The writer recalls one instance of a foundry (or rather a group of foundries, melting over 100 tons daily) in which over 400 feet of shafting conveyed the power to the various widely separated machines, and 500 feet would probably be a low estimate of the amount of belting in daily service (and this does not include a rope drive or two), all in constant motion whether doing useful work or not.

With a compressed air system, using engines on each machine, power is used only while the machine is in operation. When it stops the consumption of power stops, and the air in the service pipe will stand idle all day if necessary; then when required it is instantly ready for service if even for a moment only. We all know how tempting the use of separate steam engines has been in the past, and that the principal objection to that system is loss through condensation. Their use on cranes has been curtailed owing to difficulties attending transmission of both live steam and exhaust. It is in this intermittent work that the largest item of saving records itself, and much of the power work of a foundry is intermittent. Especially does this apply to the various hoisting operations.

As stated above, the average amount of power utilized in hoisting will probably be about five h. p. for 10 hours This appears a low estimate, and it will seem lower when we consider the amount of hoisting done as expressed in ton feet, but in reality it is a very liberal estimate if we take the power actually utilized. But in a belt power establishment it is more because so much power is consumed in turning the shafting and because power thus used goes on continually and not intermittently, as in a motor or engine system.

Let us consider in a general way what amount of hoisting is actually done in a machinery foundry of, say, 30 tons daily capacity. It will probably seem greater when represented in ton feet than we have been accustomed to estimate it, and it will appear less when represented in dollars and cents. We will assume that the iron and coke is unloaded by the wheelbarrow method, and will not consider that, nor indeed any work which does not require the service of either a hoist or a crane. Let us begin with the elevator. Modern practice places the charging floor from 16 to 20 feet above the ground. The entire 30 tons of iron must be hoisted this distance, so we have the daily hoisting represented, 30 tons x 18 feet = 540 ton-feet iron and about 4 tons x 18 feet = 72 ton-feet coke. The lifting of flasks, copes, etc., is more difficult to estimate, but as nearly as can be obtained by actual observation it will amount to an average daily lift of 500 ton-feet. Of the 30 molten tons of iron, 20 to 25 tons will be many times handled by cranes, and the various operations of shaking out, storing flasks, cleaning, chipping, loading and breaking castings represents 900 feet-tons more. This, in all, equals about 600 feet-tons for the elevator service and about 1,400 feet-tons for general crane service, making a total of 2,000 feet-tons per day, or an equivalent of 2,000 tons hoisted one foot or one ton hoisted 2,000 feet. Of course this result would vary greatly with different kinds of work. A pipe foundry would show a much higher result and a foundry making light castings would show a smaller total, but we will take as our example a foundry whose hoisting represents 2,000 ton-feet daily, and this generally will be a 30-ton plant.

What is the best power with which to handle this material? The correct answer is that probably no one power is best adapted for all the various operations; but, assuming that one power is to be used, it seems to the writer that compressed air is the most available.

Mr. Richards asserts that compressed air costs about five cents per 1,000 cubic feet of free air. This is the basis usually taken in making estimates, and at first thought it seems to be very cheap, but with a modern four-stage compressor the cost will be much less; in fact, in some cases it is difficult to see how the cost per 1,000 cubic feet of free air can reach four cents, including depreciation, repairs, oil, fuel, interest and miscellaneous items. Assuming five cents, however, as a basis, the power cost of lifting one ton one foot, in a direct acting air hoist, is about $\frac{7}{1000}$ of one cent, or to put it on a more comprehensive basis, seven cents per 1,000 ton-feet. We

*Read at the meeting of the Western Foundrymen's Association Chicago, September 16, 1896.

have already seen that the average amount of hoisting in a foundry of 30 tons daily output was 2,000 ton-feet, so the power cost of doing this work, including power repairs, power labor, fuel, oil, interest, etc., is not over 14 cents per day. The operating labor is to be added to this to estimate the total cost of hoisting. (In these calculations the hoisting is alone considered, and we may assume that lowering is done as cheaply by one power as another). In order to obtain the operating labor cost we must first obtain the speed of hoisting. We have made a series of tests with hoists ranging in diameter from 4 inches to 16 inches, and in capacity 600 pounds to 6 tons. On small hoists the valve ports were approximately of $\frac{1}{10}$ inch area, on larger hoists some were of this area, others of $\frac{1}{5}$ inch area. The speed of hoisting varied from 25 feet per minute in six-inch hoists, fully loaded, to six feet per minute for six-ton hoists. The average speed was found to be not far from 20 ton-feet per minute. Of course under high pressures this would be increased, but the object was to find a safe average speed for normal service.

Taking this on a basis of 2,000 ton-feet per day, assuming the operator's labor at $2 per day, we have an operating or attending labor of about 25 cents per 1,000 ton-feet. The total cost, therefore, of hoisting one ton 1,000 feet will be about 32 cents, or in a foundry of 30 tons daily capacity about 65 cents per day, using direct-acting vertical air hoists. If geared hoists are used, the amount of air necessary to lift a ton-foot will be increased and the power and operating cost will be more nearly represented by 90 cents per day.

Here we may call attention to the fact that the ordinary vertical direct acting air hoist is one of the most efficient hoisting machines in use. It utilizes in useful work fully 85 per cent of the power delivered to it. Few geared hoists, electric, hand, air motor or steam, have a higher efficiency than 60 per cent. Some electric cranes show a loss of 65 per cent in friction, or 35 per cent efficiency, although the average efficiency of the electric crane gearing is perhaps nearer 50 per cent. The average hand power crane with a drum winch shows only about 45 per cent efficiency, based on the power delivered to the machine. The average differential or worm-geared chain-hoist has 30 to 40 per cent efficiency and the cost of operating, measured in time and wages, is immense.

For the purpose of comparison, assume the foundry mentioned above to be equipped with hand-power cranes. The average speed of hoisting by hand-power, using one man, is about one ton hoisted two feet per minute. For short time work it is a little greater but for steady work it is less, and on chain blocks or worm gearing it is not much more than one ton one foot per minute. At a "two-ton foot rate" it would cost by hand power $2.50 per 1,000 ton-feet, against 45 cents per 1,000 ton-feet for air hoists doing the same work. Or, roughly, in a 30-ton per day foundry, $5 per day represents the labor of hoisting by hand-power against 65 cents to 90 cents per day by air hoists—a saving well worth considering. It may be pointed out that this saving would be equally great when using other mechanical power than air, but this would be true only when applied under certain conditions, as for instance, handling uniformly heavy loads, and even then, as indicated the power item would be 40 to 50 per cent greater, owing to the low efficiency of the geared machine as compared with a direct acting vertical hoist.

Another advantage of the direct acting air hoist is the wide variation of speed obtainable by the simplest possible means and involving practically no waste of power. With a fixed load the speed will vary automatically with the size of the port; and with a fixed port opening the speeds will vary with the weights lifted. The area of the port opening of the valve may be controlled in the usual manner by the distance the valve is opened, or in the best valves a throttle is provided independent of the main lever, and this being fixed for a given port opening, the valve may be thrown fully over. This device will be appreciated by any one who has attempted to control the port opening on a hanging hoist by pulling on cords attached to the lever.

Thus far comparisons have been made with the direct acting or "cylinder" hoist, which is essentially a cylinder of cast iron, or steel, or brass, accurately bored and polished inside, and fitted with a piston and piston rod, and to the latter is attached a hook, and on the cylinder a hook or ring is provided for attachment to the trolley or beam overhead; the cylinder thus hangs vertically and the load is lifted by the admission of compressed air on the under or "piston rod end" of the cylinder. This is apparently a simple machine, but if accurate or efficient work is desired great care and experience is necessary to properly construct it. Once properly made, it is easy to take care of, its parts are few and not subjected to much wear, and are cheaply and easily replaced when worn. A poorly designed hoist or one cheaply constructed is not a good investment.

This cylinder type or direct acting hoist is capable of a number of modifications. The cylinder, with its heads and piston, its hooks and stuffing box, occupy considerable space vertically and require usually a fairly high ceiling. This should be borne in mind when selecting the hoist, for a very common mistake is that of choosing too long a stroke for the ceiling space. The distances to be added to the stroke to get the total length between bearing points of hooks when hook is lifted to its highest point (or to be added to double the stroke when hook is extended, to secure length over all) range from one foot in the small 4-inch or 5-inch hoists to two feet in the 16-inch to 20-inch hoists. If a swiveled hook is used these dimensions are increased about 50 per cent. Many times a long stroke is asked for when a short stroke would do as well; there is no advantage in this, and it is usually unsatisfactory because it really reduces head room rather than increases it. Probably the foundry of the futnre will have its very lowest ceiling not less than 20 to 25 feet high, because vertical air hoists will become so essential that their influence will assert itself upon the architectuure of the plant. Horizontal cylinders may be used in exceptional cases where vertical hoists cannot be used, and these are constructed in a variety of forms. The cuts Nos. 4 and 5 shown in Fig. 1 illustrate one type, and they may be applied to cranes in numerous ways. No. 3 shows another method of securing a high lift in a small head space. Other special applications of air hoists are also illustrated. No. 1 shows a hoist supporting a long operating cylinder upon its piston, designed for grappling. Two cylinders may be also readily combined for tipping a laddle or dumping a bucket by somewhat modifying this design. No. 2 illustrates a vertical storage hoist designed by Mr. Fisher of the Griffin Wheel Co., and used in its plant. The ordinary vertical hoist is surrounded by a small receiver, and when traveling a considerable distance and the load is to be lowered and another load raised, air is taken from the receiver for this purpose. This is applicable to locations where a hose cannot conveniently be carried. Wherever an air cylinder can be used, however, whether on cranes or elsewhere, it is desirable to use the vertical direct acting type, because it is more easy to operate, is higher in efficiency, and hoists with a more even and smooth lifting motion than do horizontal or other types.

The elasticity of air when used in a direct acting hoist is well known and is many times an advantage. In a well-made hoist properly cared for, the lowering of the load due to leakage is not sufficient to cause trouble. A uniform load may be held usually for several minutes at any point without perceptible drop. If it is desired to hold the load for a longer time, this may be accomplished by raising the piston to the top of the stroke and leaving the air pressure on; or by adjusting a slipping or pinching collar on the piston rod the load may be held by air pressure at any point. The raising of the load when pouring metal, due to expansion of air in the cylinder, is generally an advantage, obviating the necessity of hoisting the ladle as it empties by opening the valve. If the rise to too great, a little air may be released. For certain special duties some hoists have been equipped with automatic release valves, others with slides and valves which automatically open for the admission of air to compensate for leakage and for the release of air when the load rises. An automatic means for closing the valve at top of stroke is serviceable in saving air and is assumed in the calculations in this paper.

When applied to cranes, positive action of the load may be obtained by the use of a water reservoir between the air pipe and the hoisting cylinder, with a regulating valve between reservoir and hoist. The hoisting cylinder then becomes practically a hydraulic hoist and should be constructed as such. The whole appliance is essentially a hydro-pneumatic hoist. The speed may be perfectly controlled by the regulat-

ing valve, or the load may be held indefinitely by closing this valve. An appliance of this kind is of course open to the same objections that are advanced against a hydraulic hoist, especially in an exposed location subject to a freezing temperature This may be overcome, in a measure, by the use of oil or an anti-freezing mixture in the reservoir. The hoisting cylinder may be placed horizontally with the reservoir below it, but there is less friction and better results generally obtained from a vertical cylinder.

There are numerous places where a direct lifting hoisting cylinder, either vertical or horizontal, cannot be used. Scant head room, short spans or jib of cranes, and occasionally a demand for a perfect or positive action without the elasticity of direct pressure, sometimes prevent the use of hoists of this character. It is here that the geared or air motor type finds its field of usefulness. We are all familiar with the modern three-motor electric crane and with the well-known steam jib crane so generally employed in pipe foundries. Undoubtedly the electric crane owes its popularity largely to the ease of transmitting the power from a fixed point to a moving machine. Until its appearance, the power traveling crane in general use was either belt or rope driven or operated by a square shaft. The power was subdivided and reversed by an intricate system of clutches, bevel gears and frictions. No one would now think of returning to that "all day" fuel consuming method unless the crane travel was exceedingly short, or the conditions much more favorable than usual. The electric crane offered emancipation from such systems, in the form of independent motors for each function, an easy method of reversing, and a consequent minimum of mechanism outside of the motor, a variety of speeds and a simple and highly efficient method of transmission.

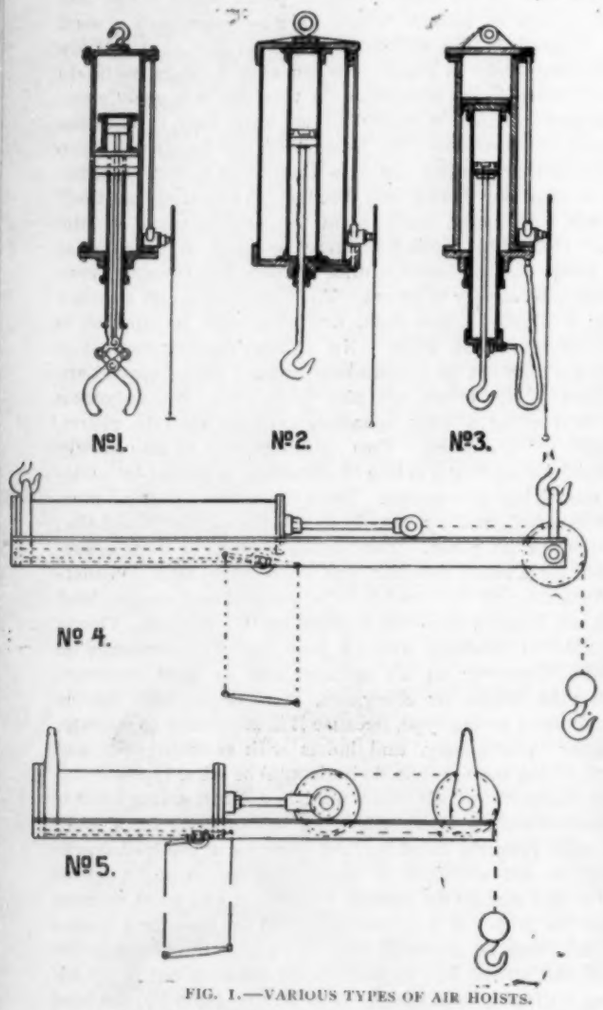


FIG. 1.—VARIOUS TYPES OF AIR HOISTS.

The three-motor compressed air traveler possesses all these good points, with the addition of lower first cost and greater simplicity. With a proper pipe-line the transmission loss is less than in electricity. The engines are as simple as those used for steam, and may be easily reversed and controlled. Rheostats and expensive controllers are not needed; and the speed is reduced by throttling and saving the power rather than by consuming it. The valves may be controlled as easily from the floor of the shop as from a cab—a feature well worth consideration in a shop of limited output where a crane man's time in a cab is a serious item of expense. The half-tone cut below (Fig. 2), shows a 10-ton air motor crane operated from the floor. This crane was originally designed for operation by electric motors, but at the last moment air was substituted with equally good results. The air engines were applied in the same manner that electric motors are, and owing to their compact form the air crane trolley is much smaller than the electric trolley. A muffler is provided, making the crane operate with as little noise as when operated by electricity. The span in this case is so short that travel of the trolley is effected by a pendant hand chain, and a cab was not considered necessary. In certain classes of foundry work a number of these cranes (one for each group of molders, for instance) running on a series of parallel tracks and operated by the men on the floor, would undoubtedly possess many advantages over a single traveler of long span attempting to cover the entire foundry floor. The speeds of travel and hoisting may be made as high as in an electric crane, the power of the engine employed being the only limit to the speed.

The air is usually carried in a rubber hose. The slack of the rope is supported by a number of small trolleys riding a taut horizontal wire along the crane runway. The hose connection is made at one end of the runway and as the crane travels out it simply pulls the hose after it, and when it returns the hose is pushed before it, folding back against itself as the trolleys are pushed together. We have carried air in this manner a distance of 250 feet without the slightest trouble. The beauty of this system compared with other hose systems is the absence of couplings and connections and the consequent small opportunity for leakage. Sometimes when the travel is long, several wires are used, each supporting a separate trolley. The connection between the main supply pipe and the hose may then be made at any point along the track, for the trolleys can pass each other. The hose in all cases should be amply large, ¾ to 1½ inches, depending upon distance, and three to four-ply of good quality.

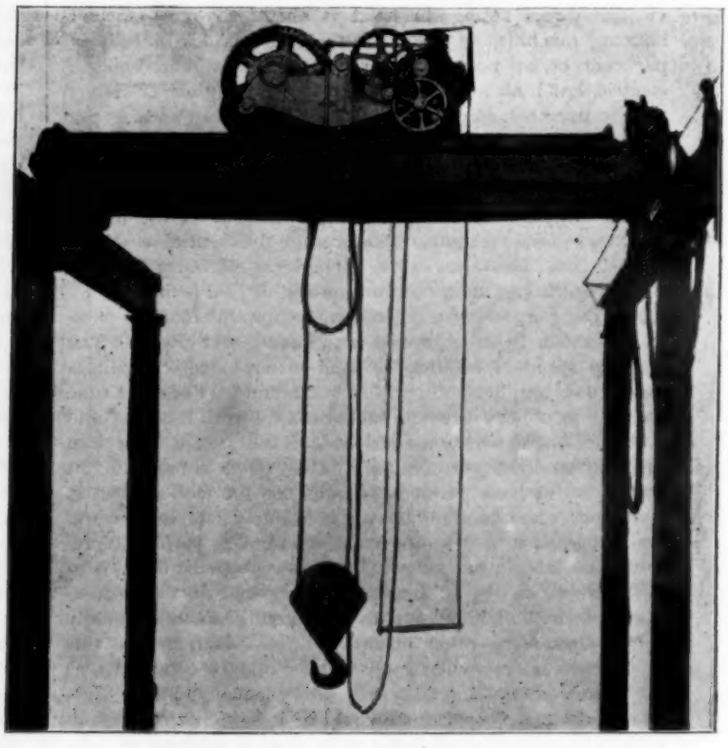


FIG. 2.—10-TON AIR MOTOR CRANE.

Air engines may be applied to jib cranes, elevators and other hoisting machinery with equal ease. They may be applied to the travel gearing of a crane with relatively equal saving as when applied to the hoist. Compact reversible engines may be readily and cheaply applied to present hand power cranes without materially changing the design, and

the crane may still be operated by hand power at times when he power plan t is not in operation. Air may replace steam in engines now in use on steam cranes. It is somewhat remarkable that founders making cast iron water pipe have not long ago adopted compressed air as a crane power. The conditions are peculiarly well suited for air; excessive heat, dust, smoke, intermittent work, and widely scattered machines in foundries of this class all offer it an inviting field. At present many of these foundries are operated by steam jib cranes, which could easily be converted into air driven machines. Some of the more recently built pipe foundry plants have installed electricity on traveling cranes, but if there is any place where air would be emphatically advantageous it is in these shops. With steam there is a great loss through pipe condensation, and the already heated air is rendered further uncomfortable by escaping steam and heated engines. Compressed air could be exhausted directly into the atmosphere of the shop and would assist in some degree in cooling and ventilating. There would be practically no loss in the pipes, as compared with steam. Air is a humane power. It does not hurt a man if he is struck by a jet. It doesn't make him uncomfortable. It is the most pleasant of all transmission powers to handle and the most convenient to subdivide.

The application of air motors also, to the gearing of existing hand-power cranes, would result in a large annual saving; it would in many cases pay for the investment in less than one year after installation.

In the consideration of compressed air for operating a hoisting plant, the question of efficiency will at once suggest itself. There is a much discussed loss of power in the compression of the air, the importance of which may be great or small, depending upon the conditions. These should always be considered, and the question of availability and economy should be looked at practically as well as theoretically. It will be well to remember that all systems embody power losses, some greater and some less than the power here under consideration, and many actual examples may be pointed out in which even electricity as a hoisting power is less efficient mechanically than air. And it is doubtful if one-half of the belt power or square shaft cranes in use will show as great economy in the use of power as a well designed air crane, without considering the large waste due to continuous motion of transmission parts, whether doing useful work or not. When the question of absolute saving in dollars and cents at the end of the year is considered, there appears in many cases a decided balance on the side of air. When using a direct acting hoist system, with a hoisting machine efficiency of 85 to 90 per cent., a higher net efficiency for air than for electric or any other modern and practical shop power can be claimed with reasonable assurance. Using a mixed system, hoisting about half by means of geared hoists and half by direct cylinder, we may claim fully an equal efficiency with an electric geared hoist system. And using an air motor crane alone, as compared with electric motor, although probably a less power efficiency is obtained, a higher economy, investment considered, may in many cases be safely claimed.

If the power at the steam engine of the plant is taken at 100, and if we deduct, first: Percentages of loss for engine and dynamo (or engine and compressor), as generator loss; second, wiring, piping, or belting as transmission loss; third, the loss in motors or air engines, or clutches, as power transmitters to the gearing; and finally the friction loss of the hoisting gearing itself, we will find but a small percentage of the initial engine power has been expended in useful work. While the conditions vary greatly, we may make a reasonably accurate comparison on a maximum load basis which would show the percentage of power expended in useful work to be as follows: Using electricity as a transmission power, with geared hoists, about 30 per cent.; using air driving motors on geared drum hoists, 24 per cent.; using a system composed of half geared hoists and half direct hoists, 35 to 40 per cent.; and using all direct hoists, 50 per cent. Of course, when handling lighter loads the efficiency would be less. Such results surely do not make a bad showing for air. There is undoubtedly a fair saving power in favor of the electric motor crane alone, but this showing of increased efficiency for electricity does not mean necessarily a greater annual economy; and a reduction to dollars and cents involves consideration of items like interest on investment, care taking and operating labor, every item of which shows a gain for air. Here is a difference between efficiency and economy. A machine may be highly efficient mechanically and still be comparatively uneconomical financially. An electric crane costs more than air air crane, and the interest on the difference in first cost will generally amount to more per annum than the saving in fuel due to the higher efficiency. It is our belief that the three-motor air crane, for instance, would not represent a greater expense per annum, investment considered, than a three motor electric crane of the same size and capacity. Making a comparison with hand power, as already stated, the cost of hoisting by manual labor in the foundry under consideration would be not far from $5 per day, equivalent in good times to $1,500 per year. By air, it would cost $200 to $250 per year, or, if we include interest on the investment, which is only fair, we will have a hoisting cost, when operated by hand power, of about $1,600 against $380 to $480 using air. The saving would go far toward purchasing a first-class air plant.

A further comparison with steam, hand, belt or electric power would call into consideration various conditions under which sometimes one power and sometimes another might be the most available or expedient. It is not our intention to in any way decry the use of electricity or other power when conditions undoubtedly recommend the use of either. It is our aim, however, to call attention to a power which has hitherto been largely left out of consideration as a shop transmission power and which, in our belief, fully deserves consideration on its merits. It is undoubtedly more economical in many cases than either of the other powers mentioned, and in numerous instances more efficient mechanically; in nearly all cases, it is the most convenient.

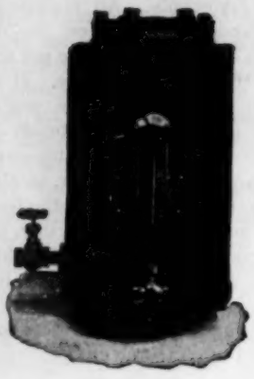
Consideration of compressed air, aside from its use as a hoisting power, is outside of the province of this paper, but since reference has been made to its exclusive employment in a plant, the subject of its availability for other purposes in foundry practice may be briefly noted. As already shown, the greater amount of power in the ordinary foundry is required to operate the cupola blower. In an imaginary foundry operated exclusively by compressed air, this blower, even if located at a distant point from the boiler, could be readily driven by a direct connected air engine provided with an inexpensive reheater, at an economy equal to, and many times greater than that obtained by a steam engine directly attached.

There are well-known advantages in operating a blower by an independent engine using either air or steam, the principal one being the case with which change of blower speed may be effected.

In plants having the blower located close to the boilers, steam could be used advantageously in the engines and the air compressing plant be correspondingly reduced in capacity. The tumblers could be readily operated by motors, and here the exhaust could be also utilized. Sand sifters, portable or otherwise, are more readily operated by air than by any other power. A small hose, with a nozzle attached to overhead hoists, serves as an unexcelled bellows for dusting molds. The air chipping tool and pneumatic sand blast promise improvement in the work of cleaning castings, and the castings may be readily broken by pneumatic drops. In many cases, it has been found advantageous to weaken a heavy casting by drilling a line of holes in it with a portable air drill, after which it readily succumbs to the blows of the drop. The advantages of an air elevator are covered by our reference to general hoisting.

These are a few of the many diverse applications of air in a foundry which readily cluster around an air hoisting plant.

It may be advisable here to offer and repeat a few suggestions as to the proper care of such a plant, especially that portion of it relating to the hoisting appliances. The foundryman must not get the impression that all he has to do is to have the machinery installed, and that it will operate without further care or attention. Compressed air enjoys no special privileges. Its components are not exempt from those laws that govern other elements, and knowledge of this at the start will often save trouble later. For instance, air has an advantage over hydraulic power in exposed locations, because it will not freeze; but if the pipes are improperly installed, the heated air will deposit water which will collect in inviting



Whenever you contemplate making any particular use of exhaust steam, either for heating water, for heating buildings, for use in any kind of heating systems, or for any purpose when condensed, it will undoubtedly pay you to devote a little time to investigating appliances that will thoroughly remove the cylinder oil from your exhaust steam.

The principal reason for our calling your attention to this matter hinges on the fact that we make appliances for purifying exhaust steam of exceedingly high efficiency. In other words, we can so effectively remove oil from exhaust steam that this steam by actual contact can be safely used for heating water for boiler feed and other purposes, or used for similar purposes when condensed.

Almost One Thousand (1000) of the COCHRANE SEPARATORS are now in use—most all of them have been sold by "One man telling another, making known their fame." "Our light has not been hidden under a bushel," for we number among our customers, in this one specialty, many of the largest concerns in the country.

We have tackled some pretty hard problems in this line, and with results satisfactory to our customers. Have you any oil separation problems?

Harrison Safety Boiler Works,

Manufacturers of
Cochrane Separators.
Cochrane Feed-Water Heaters and Purifiers.
Improved Wharton-Harrison Safety Boilers.

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places and freeze as readily as any other water. This may be avoided by properly draining the pipe line, or in particular locations, protecting it. Leakage is another item easily avoided if the plant is carefully installed. Large pipes should be used—1½ to 2½-inch mains, the larger the better, with smaller connecting pipes. The receiver should be frequently drained and an occasional "U" in the main, with a drip and cock at the bottom, will keep the pipes free of moisture. More than one receiver may often be advantageously used in a plant of large dimensions with intermittent work, one at the compressor, and others near the point of direct service. Reheaters on motors yield undoubted economy when used on a machine operating continuously for several hours. On cranes used infrequently, or on other intermittent work, it is doubtful if they would show much gain unless used in connection with an automatic attachment which partially turned off the heater while the motor was not operating. On cranes used almost continually, as in pipe foundries, a reheater at each engine would bring the air geared hoist very near, if not above the electric hoist in mechanical efficiency. Direct acting cylinder hoists should be kept well oiled. A good quality of "neatsfoot" oil has been thus far found most suitable for preserving and softening the packing used in the pistons. Oil should not be allowed to get onto the rubber hose, unless a specially prepared hose is used,—it causes it to decay. The pipe line, when first installed, should have all dirt or dust blown out before attaching it to the machines. An air hoist should be loaded and copiously oiled, and raised and lowered several times when first put into service to get it into good working order. A pressure of 60 to 100 pounds has been found most convenient for general use.

Briefly summarizing, air is undoubtedly a most convenient power to subdivide into many small hoisting units, and when so used shows high mechanical efficiency, and a large saving in handling products. It is more easily applied to geared traveling or jib cranes than either electricity, steam or belt power, and compares favorably in mechanical efficiency with either, and is in many cases actually more economical than either when so used. It is easily installed, of comparative low first cost, and can be taken care of by an ordinary machinist. It is handled without danger, and therefore is an ideal portable power. It is worthy of serious consideration not only as a hoisting power, but as the exclusive transmission power of the modern foundry.

THE unsecured creditors of the Westerman Natural Gas Iron Co., Marion, Ind., have gone into court and asked for the production of the books and papers of the company. They allege that three months before the assignment $80,000 worth of material was bought by the company and that none of it appeared in the assets at the time of the failure.

AT Richmond, Ind., Gaar, Scott & Co., proprietors of well known implement works, closed down Sept. 26, and will probably remain idle for several weeks. It is reported to be the first time in years that the works have been completely closed.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants :—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Pacific Coast Pipe Co., of Los Angeles, Cal., has been organized to manufacture, buy and sell iron and steel pipe, with a paid up capital stock of $100,000. The directors are: John E. Koeberle, Robert J. Northam, Fannie Northam, James E. Knight and Edwin A. Meserve.

The Eagle Mfg. Co., of Kansas City, Mo., has been organized with a capital of $100,000, half paid up. The stockholders are: Hiram F. Devol, George H. Devol, Samuel B. Stockley, James A. Stockley, James R. Mare and Winfield S. Liengood. The company will manufacture farm implements.

The Knickerbocker Ice Co., 134 Van Buren st., Chicago, wants to buy a second-hand lathe, 12 to 14 foot bed, 24 to 30 inch swing, and a heavy punch and shear.

L. M. Clymer, of Salem, Va., will locate machine works in Greensboro, N. C. He will erect a corrugating plant, with iron-working machinery and is in the market for roll grinders, currugator, drill press, lathes, planers, etc.

The Ober Lathe Co., Chagrin Falls, O., asks prices on nail machinery.

The Greenville Tube Co., Greenville, Pa., will install new machinery.

The Norristown Wire Co., Norristown, Pa., will increase its plant, and place new machinery.

The Lansing Boiler & Engine Works, Lansing, Mich., will make a large outlay, equipping a plant to manufacture boilers and engines.

H. T. Bush & Co., Detroit, Mich., filed articles of incorporation, capital $200,000, to manufacture machinery planers, drilling machines, engines, etc.

New Construction :—

The National Tin Plate Co., of Anderson, Ind., has decided to erect another plant at some other point. It will be a nine mill plant. Bids of bonus for the location of the plant are asked.

The contract for the erection of a large steel plant at Mariopol, Southeastern Russia, has been secured by Miller Bros. & Co., of Pittsburg, a well known firm of engineers and contractors. James C. Miller, a member of the firm, who will superintend the work, will sail for Russia this week.

The Chattanooga (Tenn.) Pulley Co. is to rebuild its plant recently destroyed by fire.

J. C. Steel, of Statesville, N. C., are preparing to erect new buildings for their foundry and machine shops. The foundry will be 36x68 feet, and the shop, 50x100 feet.

At Farmer City, Ill., it is proposed to erect a number of buildings for a new foundry enterprise, the main one to have a 200-foot front, 50 feet wide and three stories. The foundry will be 100 feet long, 60 feet wide and one story.

At Lynchburg, Va., the Lynchburg Plow Co., is at work on the buildings for its plant which will include foundry, grind-

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Proprietors of the CELEBRATED Mount Savage Fire Brick

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OPENHEARTH STEEL CRUCIBLE CASTINGS.

ing-room, paint and wood shops; buildings 100x40 feet, 40x100 feet, etc.

Eastern capitalists have been in Beaver Falls, consulting regarding the erection of a large plant for the manufacture of chains under a new process.

Additions, Enlargements, Removals, Etc.:—

A large addition is to be erected to the plant of the American Machine Co., Pawtucket, R. I. It will be 250 by 60 or 90 feet. This new addition will nearly double the size of the plant, and is necessary on account of the increase in the business.

The Hinckley & Egery Iron Co.'s foundry at Brighton, Maine, is undergoing many improvements and is to be very materially enlarged, the new addition being 60 x 60 feet, with a monitor roof.

The Buhl Steel Co., Ltd., which has an open hearth steel plant under erection at Sharon, Pa., has decided to increase its capital stock from $300,000 to $600,000, and has asked the stockholders to double the amount of their subscriptions. The capacity originally decided upon will be largely increased, and the plant, when completed, will be about double the size originally intended.

Thomas Carlin's Sons, of Allegheny, Pa., have decided to ship part of their Chattanooga rolling mill to the works in Allegheny.

J. H. Sternbergh & Son, of Reading, Pa., have recently completed additions to their mill plant and now have five trains of three-high rolls, one 18-inch, one 12-inch, two 10-inch and one 9-inch, with six heating furnaces, having an aggregate annual capacity of 35,000 to 40,000 tons of rolled iron and steel.

At Reading, Pa., the Chantrell Tool Co. are doubling the capacity of its works.

The Warrior Machine Works, Birmingham, Ala., will erect an addition to its plant, consisting of a machine shop 70x150 feet, to cost $5,000, and equipped with machinery to be operated by electricity.

Fires and Accidents:—

The plant of the Chattanooga Stove Co., Chattanooga, Tenn., owned by the Cleveland, O., Co-operative Stove Co., was badly damaged by fire Sept. 28, with loss of $15,000 to

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1—36x36x18 ft. Sellers Planer.
1—36x36x20 ft. N. Y. Steam Engine Co. Planer.
1—16x18″ Lathe & Morse Crank Planer.
2—15″ Hendey Shapers.
1—15″ Youngson Shaper.
1—15″ Smith and Mills Shaper.
1—10″x5′ Prentice Engine Lathe.
1 each 14″ and 15″x6′ Ames Engine Lathe.
1—16x5 ft. Bullard Engine Lathe.
1—18x8 ft. L. W. Pond Engine Lathe.
1—24x8 ft. Phillips Engine Lathe.
1—24x14 ft. Lathe & Morse Engine Lathe.
1—38x14 ft. New Haven Engine Lathe.

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General Purpose Forming Rolls—all sizes.
Tools for Boiler Shops, Machine Shops and general iron manufacturing industries.
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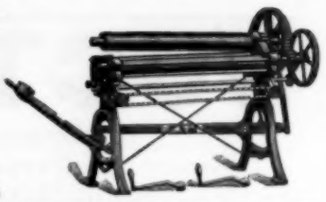

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AIKEN Duplex and CRITCHLOW Valves, either three or four way, for operating Mill and Hydraulic Machinery of all kinds under any desired pressure, and Stop Valves for same.

Agents for the CAMERON STEAM PUMP, which is made in every possible variety, and suitable for all purposes to which Steam Pumps can be applied.

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$20,000. Made-up stock and patterns were damaged considerably.

General Industrial Notes:—

In answering the court petition of Wm. Sellers and John Sellers, Jr., minority stockholders of the Midvale Steel Co., for an opportunity to examine the books of the company, the officers say that they will submit themselves to any order the court sees proper.

In regard to the passing of the dividend by the Illinois Steel Co., a Boston director of that company is quoted as follows: Since the middle of June there has been absolute stagnation in the iron and steel business. The company had numerous orders and contracts ahead, but in many cases they were canceled or held in abeyance for various reasons. In view of these contracts it was necessary that the company make large purchases of raw material, which it did, but the cancellation of orders left it with large stocks of raw material on hand. The company is in splendid financial condition. It has over $1,000,000 cash on hand, and its raw material will more than pay all its debts. In view of the company's poor business the last three or four months and the present disturbed financial and political situation it was not considered wise to pay a dividend. However, prospects are very good for the future. Within the last week more inquiries have been received and more orders placed than during the last four months.

The Burden Iron Works at Troy, N. Y., resumed Sept. 28, with a force of nearly 1,500, which is somewhat less than the usual number.

The Westinghouse Electric Co., of Pittsburgh, has put on 200 men who had been suspended at its works at East Pittsburgh. The winding department will also partially resume. The Westinghouse Air Brake Co. has posted a notice telling the men employed in the Wilmerding works to return to work. The different departments had been idle two weeks.

The Eleanor Iron Works at Hollidaysburg, Pa., started up Sept. 28, after a long idleness. The works at Tyrone in the same county have resumed also.

Extensive improvements have been made at the Elliott-Washington Cold Rolled Steel Works, New Castle, Pa. This plant has a large number of orders on its books for future delivery and is expecting a very busy time as soon as the election is past.

The nut and bolt works of Plumb, Benedict & Barnard, at North Tonawanda, N. Y., have resumed work recently with a full force of 400 men.

The rolling mill of the Reading Iron Co., Reading, Pa., has resumed work with 200 men, after a long idleness. Other departments will resume shortly.

Furnace A of the Maryland Steel Co., at Sparrows Point, Md., has been banked.

The Troy Steel Co., of Troy, N. Y., made its first basic-Bessemer blow in the new plant recently.

The statement of the Tennessee Coal, Iron & Railroad Co. for August shows a net increase in earnings of $78,208, and for the eight months ending with August a net decrease in earnings of $38,885, and in the surplus of $21,112. The reduction in earnings is due to the depreciation in the price of iron and charged off in August.

The Pittsburgh Forge & Iron Co., Verner Station, Allegheny, has started up in part.

The Oliver Iron & Steel Co.'s plant at Pittsburgh has resumed after a shut-down of several weeks.

The American Stoker Co., of Dayton, O., has recently perfected a steam motor which is applied to each stoker, thus making each machine independent. This renders the work of

installation very simple and also makes the stoker practicable for use under marine boilers. This company desires a general representation through engineering firms handling pumps, heaters and boiler room supplies and invites correspondence.

Moorhead Bros'. mill at Sharpsburg, Pa., has shut down.

The Boston Iron & Steel Co.'s plant at McKeesport, Pa., has resumed after a long shut-down.

Contracts have been let by the Illinois Central for the construction of 16 heavy passenger engines and for sufficient 75-pound steel rails to replace 60-pound steel now remaining.

The old steel rail mills of the Edgar Thomson Steel Works, at Braddock, Pa., were put into operation Sept. 27. They employ over 300 skilled hands. The plant had been closed for a month. One of the blast furnaces may be blown in this week.

The Pennsylvania Steel Co. found a slight increase in inquiry for steel last week. Although there was but little demand for rails, improvement was shown in other departments.

The New Castle, Pa., works of the Atlantic Iron & Steel Co. started up Sept. 28, and on the same date the New Castle Tube Works resumed.

John Fulton, of Johnstown, Pa., is representing a New York syndicate which has options on 200,000 acres of coal lands in Fentress and Cumberland counties, in Tennessee. The field is said to contain two beds of bituminous coal three and one-half feet thick. Mines will probably be developed.

Receiver James F. McKean, of the Pittsburg Steel & Iron Mfg. Co., has set no time for putting the Soho plant in operation.

The new Garrett mill at the Joliet works of the Illinois Steel Co., produced during one day last week 520 gross tons of wire rods. It is expected to reach 750 gross tons per day.

At the Ashland, Ky., Steel Works, it is reported that experiments with the pneumatic process have yielded a product that very closely approximates puddled iron in constituency, but at a very much lower cost.

The General Electric Co. is said to have three or four large contracts in abeyance, and the specifications are simply withheld to await a clearer political outlook. The company is employing 3,000 men, and if the verdict at the polls in November is in favor of sound money President Coffin is authority for the statement that the working force will be increased to 4,500.

George Place, of New York, announces that the dissolution of the George Place Machine Co., through a receiver, in no way affects him or his regular business, as he had no financial interest in the company.

The 12-inch mill at the Sharon Iron Works, Sharon, Pa., resumed last week after a week's idleness.

The wire mill and wire nail mill of the New Castle (Pa.) Wire Nail Co. have been put in operation.

Secretary Nutt, of the Mahoning and Shenango Iron Manufacturers' Association says that while a little more work is being done at Valley mills than in the first week or two of September, no general resumption is to be expected for some weeks.

Excursions to Dayton, Knights Templar of Ohio.

Oct. 13th and 14th, special excursion tickets will be sold to Dayton, O., from ticket stations on Pennsylvania Lines, for Meeting of Grand Commandery, Knights Templar of Ohio. Return coupons will be valid through to original starting point on or before Oct. 17th.

Among the orders received by the Prentiss Tool & Supply Co., Chicago, last week, were a milling machine and a drill which go to London, Eng., and some machinery destined to Mexico.

Excursions to Pittsburgh Via Pennsylvania Lines.

Oct. 12th, 13th and 14th, from ticket stations more than 200 miles from Pittsburgh, and Oct. 13th and 4th, from ticket stations not exceeding 200 miles from Pittsburgh, special low rate excursion tickets will be sold to Pittsburgh via Pennsylvania Line for Annual Convention of Brotherhood of St. Andrew; return coupons will be valid through to original starting point on or before Oct. 20th.

Steam Yachts and Marine Machinery.

Also Towing Launches built by Marine Iron Works, Clybourn and Southport avenues, Chicago. Free illustrated catalogue. Write them for it.—*Adv.*

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HOISTING ENGINES

For Every Possible Duty.

MINE CARS, SKIPS and MINE EQUIPMENT.

"FARREL'S" (Blake Pattern)

ORE AND ROCK CRUSHERS

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HIGH SPEED OR GEARED CRUSHING ROLLS

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4,500	feet	new	8	inch	piping.
6,000	"	"	8	"	"
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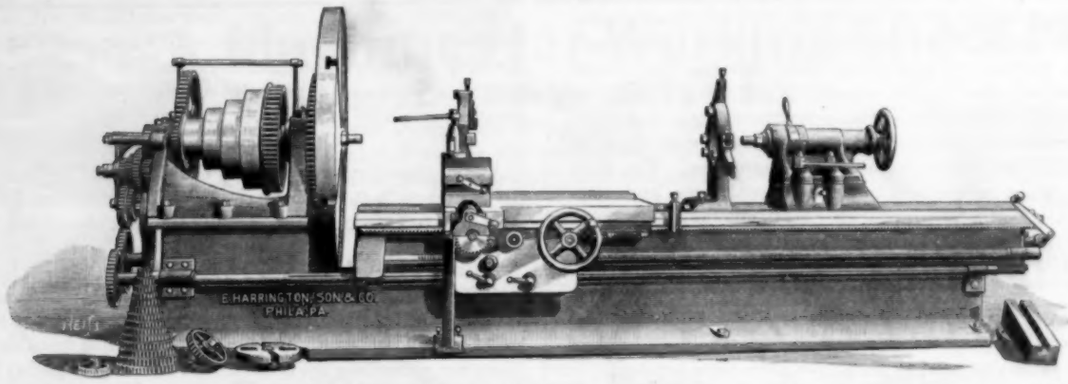
You will do More work, You will do Better work.

Sliding Top Extension Lathes. Four Sizes.
Easily adjusted for Large and Small Diameters. Strong and Powerful. Send for full Description.



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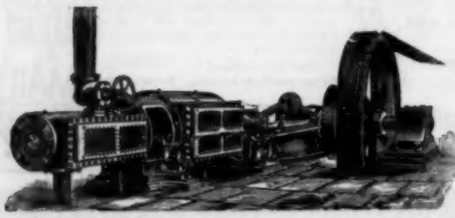

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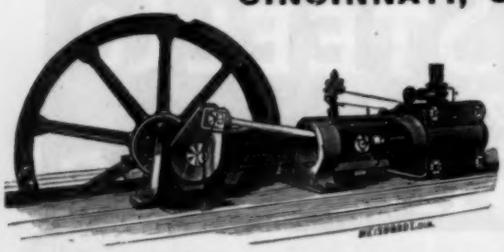

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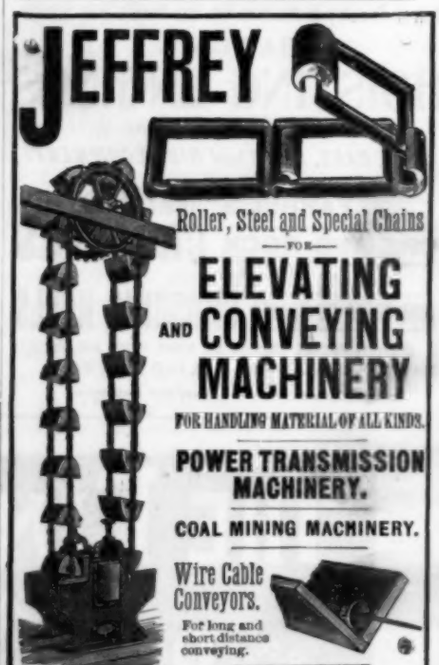

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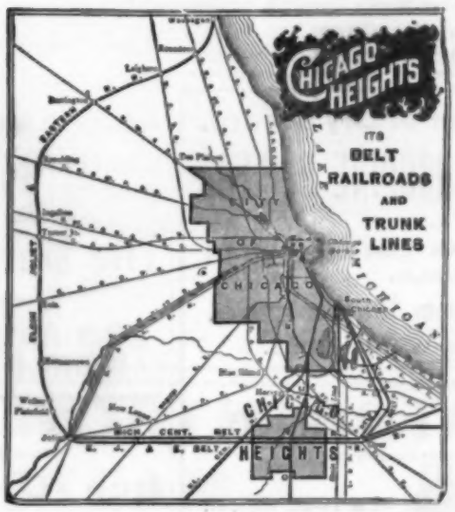

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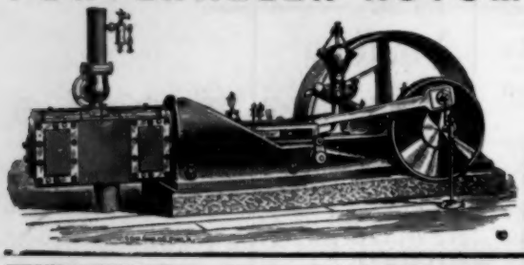

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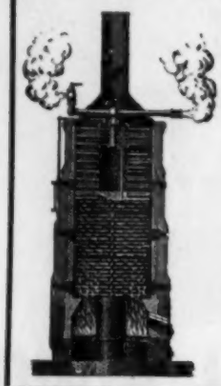

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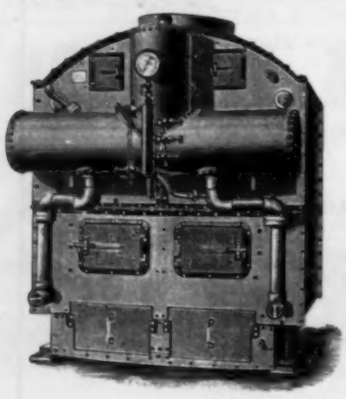

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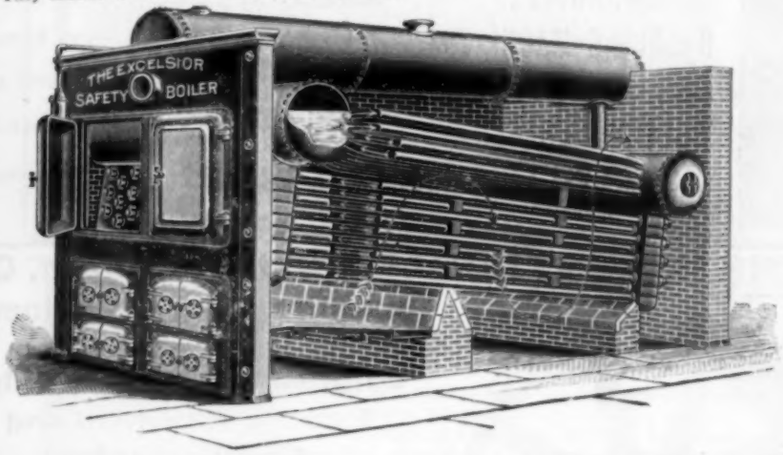

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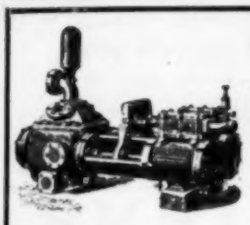

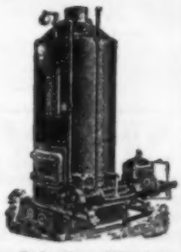

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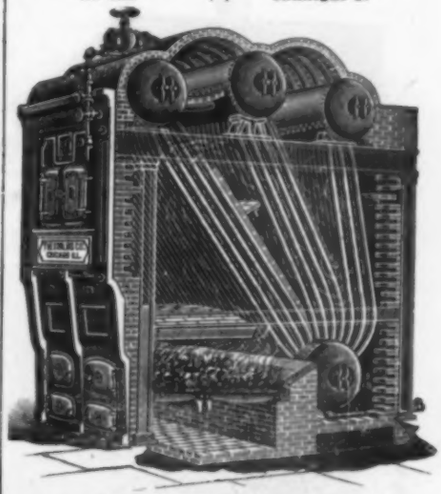

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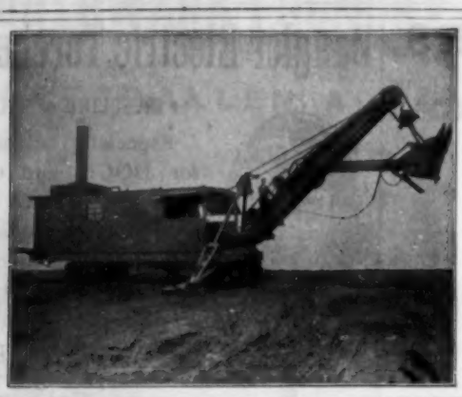

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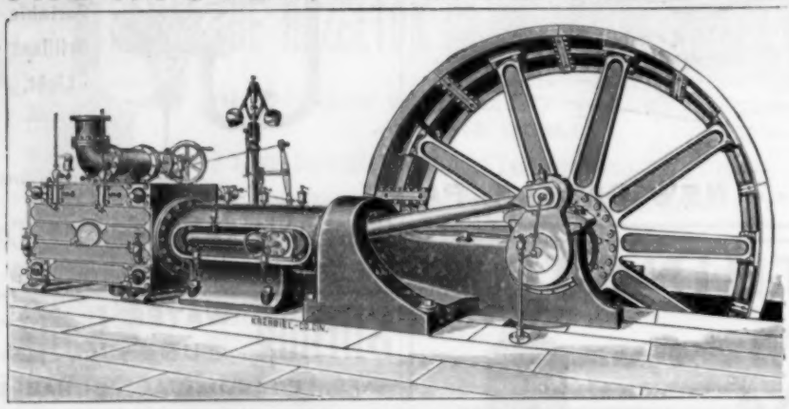

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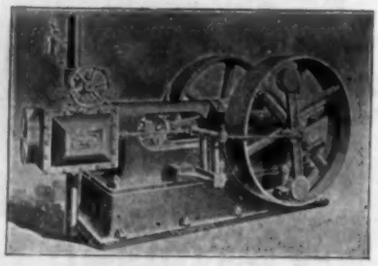

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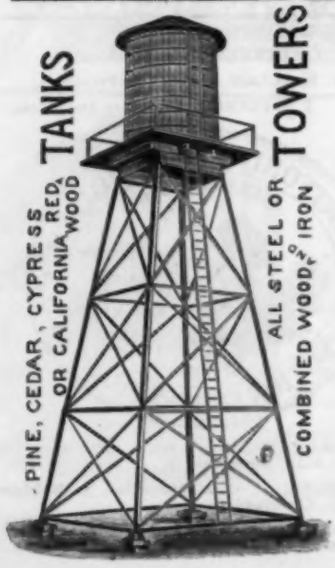

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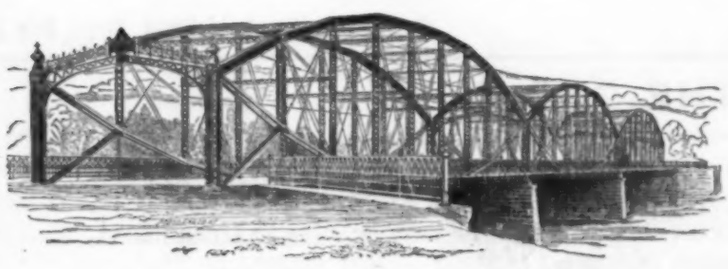

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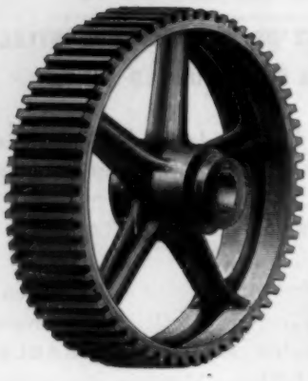

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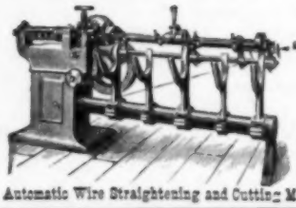

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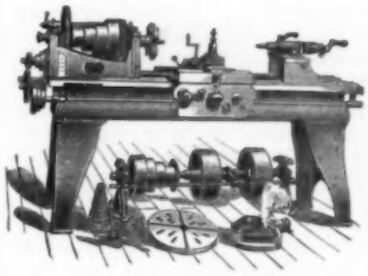
N. B. In addressing be sure and mention Dept. C.

THE WRIGHT LATHES.

WORK (W)RIGHT. DESIGNED (W)RIGHT.

THE WRIGHT CO. ENGINE LATHES LOWELL, MASS.

BUILT (W)RIGHT.



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(LARGELY DEVELOPED)

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CHAMPION STEEL ORE COMP'Y

Will sell at public vendue on

FRIDAY, OCTOBER 9th, 1896,

At 1.30 o'clock in the Afternoon,

at the Court House, Belvidere, N. J., all that exceedingly valuable Mineral Lease, comprising 122 acres, having 21 years yet to run and including purchase privilege at any time during said term, thus canceling the royalty of 30 cts. per ton, together with the complete mining outfit, Machinery, Buildings &c., situated in Oxford Township, Warren County, New Jersey, a little east of the public road leading from Oxford Furnace to Belvidere about one mile from Oxford, two miles from Belvidere and two miles from Buttsville. The broad-gauge Mineral Railroad extends directly into the property and connects at Buttsville with the Lehigh & Hudson River Railroad, which connects with the Delaware, Lackawanna & Western and the Pennsylvania Railroad within short distances—1½ and 3 miles.

The machinery includes one 83 horse-power boiler, one 37 horse-power boiler, one 20 horse-power boiler, two Munday hoisting engines, one with double drum; two ore washers, 6 horse-power vertical engine, 12 horse-power horizontal engine, four steam pumps, railroad siding, lot of piping, valves, fittings, and all the usual appurtenances of a well equipped mining property.

The Champion mines produce a superior grade of Bessemer steel ore averaging 65 per cent metal, and may be worked very profitably. The 12-foot solid ore vein alone, when reached and fully opened, should yield not less than 200 tons daily. There will also be sold about 200 tons of Bessemer ore, about 65 per cent metallic iron. Also about 500 tons of tailings, running about 47 per cent metal. Remember the lease is an exceptionally valuable one, covering and controlling as it does all the rich deposits and veins of ore underlying to great depth perhaps the 122 acres of mineral land. The Bethlehem Iron Co. have tested and used nearly 7,000 tons of the Champion steel ore while the development work was being prosecuted.

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Chain Belting—
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Berlin Iron Bridge Co., East Berlin, Conn.

Stokers—
Playford Stoker Co., Cleveland, O.
American Smokeless Furnace Co., Cleveland, O.
Brightman Furnace Co., Cleveland, O.

Structural Engineers—
Berlin Iron Bridge Co., East Berlin, Conn.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.
Central Iron & Steel Co., Brazil, Ind.

Tanks—
S. Freeman & Sons Mfg. Co., Racine, Wis.
Enterprise Boiler Co., Youngstown, O.

Tinning Machinery—
The Lloyd-Booth Co., Youngstown, O.

Tin Plate—
Morton Tin Plate Co., Cambridge, O.
Atlanta Steel & Tin Plate Co., Atlanta, Ind.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
The Cincinnati Corrugating Co., Piqua, O.

Torches—
Dangler Stove & Mfg. Co., Cleveland, O.

Tool Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.
C. H. Besly & Co., Chicago, Ill.

Tube Welding—
S. Fix Sons, Cleveland.

Twist Drills—
C. H. Besly & Co., Chicago, Ill.

Valves—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

Ventilating Fans—
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
B. F. Sturtevant Co., Boston, Mass.

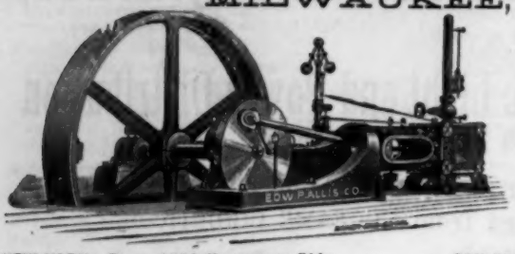
Water Tanks—
Williams Mfg. Co., Kalamazoo, Mich.

Wire Rope—
American Hoist & Derrick Co., St.
Roberts Steel Chain Belting Co., Pittsburg

Wire Machinery—
Cady Mfg. Co., Cleveland, O.
John Adt & Son, New Haven Conn.

THE EDWARD P. ALLIS COMPANY

MILWAUKEE, WIS.



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Blowing Engines, Hoisting Engines, Pumping Engines, Air Compressors, Special Engines for Electric Lighting Street Railways and Rolling Mills, Ore Crushers, Crushing Rolls, Stamp Mills, Concentrators, General Mining, Milling and Smelting Machinery.

Reynolds Patent Vertical Boilers.

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PITTSBURG, 702 German National Bank Bldg.
SALT LAKE CITY, Desert Bank Bldg.
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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

	PAGE
Adt & Son, John	27
†Addyston Pipe & Steel Co.	—
Ætna-Standard Iron & Steel Co.	32
Aitchison, Rob't Perforated Metal Co.	31
Allis & Co., Edward P.	30
Allison Coupon Co.	33
Almy Water Tube Boiler Co.	22
American Smokeless Furnace Co.	17
Atlanta Steel & Tin Plate Co.	2
Atwood & M'Caffrey	18
Bacon, Earle C.	19
Baird Machinery Co.	18
Battle Creek Steam Pump Co.	23
Berlin Iron Bridge Co.	25
Besly & Co., C. H.	36
Bethlehem Iron Co.	35
*Berger Mfg. Co.	—
*Bertsch & Co.	18
Bickford, H.	36
Bourne-Fuller Co.	22
Brass Founders Supply Co.	25
Brightman Furnace Co.	36
Bowes, F. K.	19
Brown, Edward	35
Brown Hoisting & Conveying Machine Co.	19
Bucyrus Steam Shovel & Dredge Co.	24
Buffalo Forge Co.	1
Cady Mfg. Co.	31
Cambria Iron Co.	33
Central Iron & Steel Co.	35
Chicago Heights Land Ass'n.	31
Chicago House Wrecking Co.	27
†Chicago & Northwestern Ry.	—
Channon & Co., H.	36
Church, Isaac	35
Cincinnati Corrugating Co.	2
Claflen Mfg. Co.	1
Clearfield Fire Brick Co.	35
Cleveland & Buffalo Transit Co.	22
Cleveland City Forge & Iron Co.	1
Cleveland Electrotype Co.	35
*Cleveland Galvanizing Works	—
Cleveland Rolling Mill Co.	35
Clinton Iron & Steel Co.	26
*Clonbrock Steam Boiler Co.	—
Coffman Coke Co., W. H.	32
*C. M. & St. P. Ry.	—
Cole, J. Wendell	36
Collins & Co., H. E.	1
Coshocton Foundry Co	1
Dangler Stove & Mfg. Co.	23
Deming Co.	23
Detroit & Cleveland Steam Navigation Co.	35
*Diamond Machine Co.	27
Dickman & MacKenzie	1
Dixon, Jos. Crucible Co.	27
Dover Fire Brick Co.	35
East Chicago Foundry Co.	17
Emmerton, F. A.	2
Finished Steel Co.	19
*Fix Sons	—
Fleharty, J. H. & Co.	2
Forster, Waterbury & Co.	1
Fraser & Chalmers	32
*Freeman & Sons, S.	—
*Fulton Steam Boiler Wks. & Fdy. Co.	—
General Electric Co.	26
†Garden City Sand Co.	—
Gerlach, Peter & Co.	22
Gobeille Pattern Co.	1
*Haeseler & Co.	—
Harrington & King Perforating Co.	34
Harrington, Son & Co., Edwin	20
Harrison Safety Boiler Works	16
Hartford Steam Boiler Insp. & Ins. Co.	23
Hazelton Boiler Co.	22
Hooven, Owens & Rentschler Co.	24
Hunt & Co., Robert W.	2
Illinois Central R. R.	34
Illinois Screw Co.	1
International Correspondence School	19
Iron Clad Paint Co.	31
Jeffrey Mfg. Co.	20
Jenkins Bros.	32
Jessop & Sons, Ltd., Wm.	27
Jones Foundry Co., W. A.	1
Junction Iron & Steel Co.	2
Kellogg Weldless Tube Co.	21
†Kelly & Co.	—
Lane & Bodley	20
Lloyd Booth Co.	34
*Lodge & Shipley Machine Tool Co.	—
Marine Iron Works.	19
Marion Steam Shovel Co.	35
McDowell Steel Co.	35
McEwen Mfg. Co.	24
Meehan Boiler Co.	23
Moore Mfg. Co.	1
Morton Tin Plate Co.	22
†National Jeloluse Co.	—
Newell Bros.	1
†Newport Sand Bank Co.	—
Norman Co., J. J.	2
North American Metaline Co.	36
Nuttall Co., The R. D.	26
Oglebay, Norton & Co.	26
Ohio Sand Co.	36
Otto Gas Engine Co.	31
†Phœnix Iron Works Co	—
Pittman, C. K.	2
Pollock, Wm. B. & Co.	2
Playford Stoker Co.	2
Pope, E. C.	22
Prouty Co., The	2
Q. & C. Co	36
Rand Drill Co.	2
Rippel Mfg. Co.	1
Reese, Hammond & Co.	36
Roberts Steel Chain Belting Co.	32
Rockwell & Co., W. S.	25
Sargent Co., The	17
‖Sharon Fire Brick Works.	—
Sharpless & Winchell	36
Shiffler Bridge Co.	33
Southwark Foundry & Machine Co.	22
Star Dynamo Co.	31
Sterling Emery Wheel Mfg. Co.	34
Stirling Co.	23
Stevens, F. B.	36
Stowe, Fuller & Co.	17
Stuart Fire Brick Co.	33
Sturtevant Co., B. F.	2
Sykes Iron Roofing Co.	24
Taylor & Boggis Foundry Co.	1
Textor, O.	2
Tod, Wm. & Co.	20
Toledo Machine & Tool Co.	35
Translucent Fabric Co.	25
Union Mining Co.	71
Upson Nut Co.	1–2
Westinghouse Electric & Mfg. Co.	29
*Williams Mfg. Co.	24
Westmoreland Fire Brick Co.	31
*Wormer Machinery Co.	22
Worthington, Henry R.	23
Wright Co.	27
Wellman Seaver Engineering Co.	36

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is an increasingly valuable medium through which to sell equipment to machine shops and foundries

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	$4.50@ 4.75
No. 1 Bessemer hematite	4.00@ 4.25
Hematites No. 1 non-Bessemer	2.25@ 2.50
No 1. Specular, non-Bessemer	2.75@ 3.00

PIG IRON.

CLEVELAND (f. o. b. cars):

Bessemer	$11 25@ 11 75
No. 1 Strong Foundry	11 50@ 11 75
No. 2 Strong Foundry	11 00@ 11 25
No. 1 Gray Forge, red short	9 50@ 10 00
No. 2 Gray Forge, neutral	9 75
No. 1 American Scotch	11 75
No. 2 American Scotch	11 25
Lake Superior Charcoal	13 50

PITTSBURG:

No. 1 Foundry	$11 50@ 11 75
No. 2 Foundry	11 00@ 11 25
Gray Forge	9 75@ 10 05
White and Mottled	9 50
Warm Blast Charcoal	15 00@ 16 00
Cold Blast Charcoal	20 00
Bessemer	11 50@ 11 75

CHICAGO:

Lake Superior Charcoal	$13 50@$14 00
Local Coke Foundry No. 1	12 00@ 12 50
Local Coke Foundry No. 2	11 50@ 12 00
Local Coke Foundry No. 3	11 00@ 11 50
Local Scotch Foundry No. 1	12 00@ 12 50
Local Scotch Foundry No. 2	11 50@ 12 00
Local Scotch Foundry No. 3	11 00@ 11 50
Southern Coke No. 1	12 10@ 12 35
Southern Coke No. 2	11 60@ 11 85
Southern Coke No. 3	11 10@ 11 60
Southern No. 1 Soft	11 60@ 11 85
Southern No. 2 Soft	11 35@ 11 50
Southern Silveries No. 1	11 85@ 12 35
Southern Silveries No. 2	11 60@ 11 85
Jackson Co. Silveries	14 50@ 16 00
Ohio Silveries No. 1	15 00@ 15 50
Ohio Silveries No. 2	14 50@ 15 00
Ohio Strong Softeners	15 00@ 15 50
Alabama Car Wheel	16 85@ 17 35
Malleable Bessemer	13 00@ 13 50
Coke Bessemer	13 00@ 13 50

CINCINNATI (reported by Rogers, Brown & Co.)

Southern Coke No. 1, Foundry	$ $10 00
Southern Coke No. 2 and No. 1 Soft	9 50
Hanging Rock Coke, No 1	13 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	13 00@ 14 00
Jackson County Silvery No 1	14 00@ 14 50
Southern Coke, Gray Forge	8 25
" " Mottled	8 25
Standard Alabama Car Wheel	15 00@ 16 00
Tennessee " "	14 00@ 15 00
Lake Superior " "	15 25@ 15 50

BUFFALO:

No. 1 Foundry Strong Coke Iron Lake Superior Ore	$ 12 00
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 50
Ohio Strong Softener No. 1	12 00
Jackson Co. Silvery No. 1	14 50
Lake Superior Charcoal	13 50@ 14 00
Southern Soft No. 1	11 00
Hanging Rock Charcoal	17 00

ST. LOUIS (reported by Rogers, Brown & Meacham):

Southern Coke No 1	$ $10 25
Southern Coke No. 2	9 75
Southern Coke No. 3	9 50
Southern Gray Forge	9 25
Southern Charcoal No. 1	15 00
Missouri Charcoal No. 1	14 00@ 14 00
Ohio Softeners	15 00
Lake Superior Car Wheel	5 00
Southern Car Wheel	4 50

OLD RAILS AND SCRAP METAL.

	Gross Tons
Old iron rails	$12 00
Old steel rails	10 50
Old car wheels	11 50
	Net Tons
No. 1 R. R. wrought scrap	$10 00
Mill scrap	8 00
No. 1 Machine cast scrap	8 00
Iron axles	14 00
Axle turnings	5 50
Wrought turnings (free from cast)	6 00
Cast borings	4 00
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 00
Pipes and flues (clean)	7 00
Tank iron	7 00
Hoop and band iron	5 50
Sheet iron	4 00
Wrought drillings	5 50
Malleable iron	8 50

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.65c
Angles	1.29c
Tees	1.50c
Universal Plates	1.30@1.35c
Sheared Plates	1.40c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 30
4½ to 6 by ⅜ to 1 inch	1 35
1½ to 6 by 1⅛ to 2 inch	1 35
1¼ & 1⅜ by ⅜ to ¼ inch	1 20
1 & 1⅛ by ⅜ to ¼ inch	1 20
⅛, ⅜, ½, by ⅜ to ½ inch	1 20

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.

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18, 20 and 22 Johnson St., CLEVELAND, O.

SEND FOR OUR NEW CATALOGUE OF Power Presses, Drop Hammers, Punches and Shears, Wire Working and Special Machinery.

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OF ALL KINDS FOR

MILLING, MINING AND AGRICULTURAL MACHINERY.

Perforated Iron, Steel, Copper, Brass, Tin, Zinc, Lead, Etc., to Order.
Large and Varied Assortment of Sizes. Correspondence Solicited.

THE ROBERT AITCHISON PERFORATED METAL CO.,

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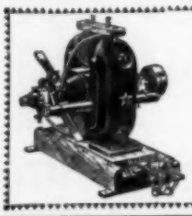
A. H. LEITCH, PREST. JOHN C. LEITCH, SEC. AND TREAS.

WESTMORELAND FIRE BRICK CO. MANUFACTURERS OF HIGH GRADE FIRE BRICKS

PITTSBURG, PA.

Works and Mines, Westmoreland, Pa.



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For Incandescent Lighting,

In Factories, Mills, etc., at a Reasonable Price.
If you have power put in your own lighting plant. Write for our Catalogue.

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POWER From **GAS OR GASOLINE.**

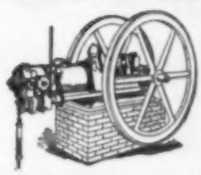
No Steam, Coal, Ash, Gauges, Engineer nor Danger.

From 1 to 250 horse-power. } **Can be Used in City or Country.**

THE OTTO GAS ENGINE WORKS, Inc.

33d and Walnut Sts., PHILADELPHIA, PA.

S. M. York, 42 S. Water St., Cleveland Agent. Over 45,000 Sold.



THE 1896 EDITION

OF THE

Iron and Steel Directory

Will be sent postpaid by *The Iron Trade Review* at $6.

Is a thorough revision of the list of blast furnaces, rolling mills, Bessemer and Open-Hearth steel works, plate and sheet mills, nail mills, tin plate mills, malleable, cast iron pipe and wrought pipe works, car wheel and locomotive works.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.

CLEVELAND OHIO.

Trade Mark Registered.

ORDER DIRECT FROM THE

Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅞ inch	1 10
2 to 2½ inch	1 30
2¾ to 3¼ inch	1 25
3½ to 4 inch	1 60
4¼ to 4½ inch	2 20
4¾ to 5 inch	2 40

Oval.

⅜ to 1¼ inch	1 30
⅜ to ¾ inch	1 30
⅞	1 50
⅜	1 70

Half Oval and Half Round.

1¼ to 3 inch	1 65
⅜ to 1⅛ inch	1 45
⅜ to ¾ inch	1 70
⅞	1 85
⅜	2 90

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 20
1 to 1¾ by ¼ and 5-16 inch	1 25
¾ to ⅞ by ¼ and 5-16 inch	1 35
½ to ⅝ by ¼ and 5-16 inch	1 60

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 35
1 7-16 to 2, No. 17, 18 and 19	1 40
1 7-16 to 2, No. 20	1 50
1 7-16 to 2, No. 21	1 60
1 7-16 to 2, No. 22	1 70
1¾ to 1⅞, No. 13, 14 and 15	1 40
1¾ to 1⅞, No. 16, 17 and 18	1 45
1¾ to 1⅞, No 19 and 20	1 50
1¾ to 1⅞, No. 21	1 60
1¾ to 1⅞, No. 22	1 70
15-16 and 1 inch, No. 13, 14 and 15	1 35
15-16 and 1 inch, No. 16, 17 and 18	1 50
15-16 and 1 inch, No. 19 and 20	1 60
15-16 and 1 inch, No. 21	1 70
15-16 and 1 inch, No. 22	1 80
⅞, No. 13, 14 and 15	1 60
⅞, No. 16, 17 and 18	1 70
⅞, No. 19 and 20	1 80
⅞, No. 21	1 90
⅞, No. 22	2 00
13-16, No. 13, 14 and 15	1 70
13-16, No. 16, 17 and 18	1 80
13-16, No. 19 and 20	1 90
13-16, No. 21	2 00
13-16, No. 22	2 10
¾, No. 13, 14 and 15	1 80
¾, No. 16, 17 and 18	1 95
¾, No. 19 and 20	2 05
¾, No. 21	2 15
¾, No. 22	2 25
11-16, No. 13, 14 and 15	2 05
11-16, No. 16, 17 and 18	2 10
11-16, No. 19 and 20	2 20
11-16, No. 21	2 30
11-16, No. 22	2 40
11-16, No. 23	2 50
⅝, No. 13, and 15	2 10
⅝, No. 16, 17 and 18	2 20
⅝, No. 19 and 20	2 30
⅝, No. 21	2 40
⅝, No. 22	2 50
⅝, No. 23	2 60
9-16, No. 13, 14 and 15	2 30
9-16, No. 16, 17 and 18	2 40
9-16, No. and 20	3 50
9-16, No. and	1 60
9-16, No. 221	2 70
9-16, No. 22	1 80
7-16 a d ½ inch, No. 13, 14 and 15	3 50
7-16 and ½ inch, No. 16, 17 and 18	2 60
7-16 and ½ inch, No. 19 and 20	2 70
7-16 and ½ inch, No. 21	2 80
7-16 and ½ inch, No. 22	2 90
7-16 and ½ inch, No. 23	3 00
⅜, No. 13, 14 and 15	3 00
⅜, No. 16, 17 and 18	3 10
⅜, No. 19 and 20	3 20
⅜, No. 21	4 50
⅜, No. 22	3 60
⅜, No. 23	3 75

Light Band.

1⅛ to 6 by ⅛ to 3-16 inch	1 60
1⅛ to 6 by Nos. 11 and 12	1 65
1 to 1⅜ by ⅛ to 3-16 inch	1 65
1 to 1⅜ by Nos. 11 and 12	1
⅞ and 13-16 by ⅛ to 3-16 inch	1
⅞ and 13-16 by Nos. 11 and 12	1 75
¾ and 11-16 by ⅛ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ⅛ to 3-16 inch	2 20
½ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	1 50
⅜ inch, " " " 13 and 14	1 60
½ inch, " " " 11 and 12	1 65
½ inch, " " " 13 and 14	1 75

Sheet Iron.

No. 10	1 45
No. 12	1 55
No. 14	1 65
No. 15-17	1 75
No. 18	1 90
No. 20	2 15
No. 22-24	2 15
No. 25-26	2 25
No. 27	2 35

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 45
Shell	1 60
Flange	1 70
Marine Flange	2 00
Fire Box	2 50

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lb
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	06

Soft Steel Bars, Light

LOW PRICES

do not always influence business. Some brands of goods are undesirable as a **Gift.**

Write us for our catalogue and send us a sample order and see if there is not **Economy** in using **First Quality** goods at Fair Prices.

Structural Shapes, Rails.

TIN PLATES,
GALVANIZED SHEETS,
CORRUGATED IRON,
BLACK PLATES,

Sheet Iron and Steel, any finish, patent leveled or common.

Aetna Standard Iron & Steel Co.,
BRIDGEPORT, OHIO.

ROBERTS STEEL CHAIN BELTING CO., Pittsburg, Pa.

Elevating and Conveying Machinery

For Handling all kinds of materials.

Special Wrought and Steel Chains of every description; Coil and Cable Chains; Chain Haulages for Coal Mines; Sprocket Wheels; Complete Coal and Ashes Handling Plants; Wire Rope Haulages and Wire Rope.

W. H. COFFMAN COKE CO.

BLUEFIELD, W. VA.

GENERAL FACTORS AND SHIPPERS OF

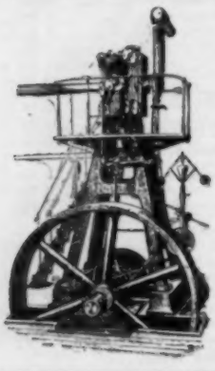
POCAHONTAS FLAT-TOP COKE.

So low in ash that it requires no fluxing for foundry purposes. Our foundry and furnace coke was awarded the first premium at the World's Fair in 1893.

AVERAGE ANALYSIS OF COKE.

Moisture	00.196	Sulphur	00.677
Fixed Carbon	93.625	Ash	05.004
Volatile Matter	00.494		

Foundry, Furnace and all sizes of crushed coke. Guaranteed lower in Sulphur than any other commercial coke



FRASER & CHALMERS, Manufacturers of Heavy Machinery, **CHICAGO, ILL.**

(Also 80 Broadway, New York; Salt Lake City, Utah; City of Mexico, Mexico; Helena, Montana; and Denver, Colorado.) Solicit inquiries on

CUT STEEL GEARS AND WALKER DIFFERENTIAL DRUMS.

Simple, Compound and Triple Expansion Corliss Engines.

STAMP MILLS, CONVERTERS AND SMELTING FURNACES.

Comet Adjustable Crushers, Perforated Metals and Screens.

RIEDLER AIR COMPRESSORS AND PUMPING ENGINES,

Anaconda Car Axles, Hercules Gas Engines, and other machine plant of which they would be glad to inform you on

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Is the Perfection of Joint Packing. Instantaneous. Does not Squeeze Out and not Necessary to follow up Joint. We guarantee it to last for years on any and all pressures of steam or any kind of joint where packing is required. **Does not Rot, Burn or Blow Out,** therefore the best for all purposes. Call for and insist on having **'96 JENKINS '96** stamped like cut.

Jenkins Bros., New York, Boston, Philadelphia Chicago.

7-16 to ⅜ and 2¾ to 3 in.	.09
3⅛ to 4 in.	.09¼
⅜ to 11-16 and 4⅛	.10
⅛ to 6 in.	.10¼
⅝ to 9-32 and 6⅛ to 7 in.	.11
7⅛ in	.13

Flats.

	cts. lbs
2 to 9-16 in. wide by 2 to ⅜ thick	.8

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 50
Open-hearth Tire	"	1 50
Open-hearth Spring	"	1 70
Sleigh Shoe	"	1 55
Toe Calk	"	1 65
Cutter Shoes, tapered and bent	"	1 70

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam.	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base	dis. 65
Butt " " "	dis.
Lap " galv. "	dis. 5⅓
Butt " " "	dis. 50
Boiler tubes 2½" and smaller	dis 62½
Boiler tubes 2½" and larger	dis. 65
Casing screw and socket joint	dis. 52½
Casing inserted joint	dis. 47½

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ lb. 9@10
Wright's	℔ lb. 12

Bellows.

Blacksmiths'	Hill's dis 40
	Bullock's dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 7c & 10
" " " extra	dis 60&10
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 50
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis
Horton's Universal	dis
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 30

Cutters and Reamers.

Cleveland	dis 0@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis
" " Gear Cutters	dis

Crowbars.

Cast Steel	℔ 3½
Iron, steel points	℔ lb 3

Drill and Drill Sockets.

Twist Drills	dis 60&10
Morse Taper and Straight Shank to 1"	dis 60&10
Morse Taper and Straight Shank Larger than 1"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 60@60&5
Cleveland " "	dis 60@60&5

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½ kegs ℔ lb	4½c	5½c	2¾c
¼ kegs ℔ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	7½c

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Celluloid ..... dis 10&33⅓
Northampton ..... dis 50
Crystal ..... dis 65@70
Vitrified ..... dis 60@70
Vulcanite ..... dis 60&10
Hamden ..... dis 60&10@75
Cyclone ..... dis 60@60&10

Files.

Arcade ..... dis 60&10@60&10&10
Nicholson ..... dis 60&10@60&10&10
" X. F ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
McClellan ..... dis 60&10@60&10&10
Disston's ..... dis 60@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50
Industry File Works Hand Cut ..... dis 50

Hammers.

P. S. W ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs 12c
" " " " over 5 lbs 10c

Jack Screws.

Illinois Bolt Co. list ..... dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	7/16	½	⅝	¾	1
Square	8	7	5⅝	4⅝	4	3⅜	3⅛	
Hexagon	15⅝	11⅜	8⅛	6	5⅛	5⅛		
Washers	9	8	7	5	4⅝	4⅛	4⅛	

In lots less than 100 lbs, ℔ lb add ½c., 1 lb boxes add 1c to list.

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Brass and Copper ..... dis 50
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Picks.

Railroads, 5 to 6 lbs ..... $12 dis 60
" 6 to 7 lbs ..... $13 dis 60

Pulleys.

Iron Pulleys, Walker List ..... dis 50
Medart Pulleys ..... dis 50
Split Wood Pulleys ..... dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block ..... dis 20

Rivets.

Iron, Thousand, list November 1, 1894 ..... dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894 ..... dis 60@65
Copper ..... dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in ..... dis 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list ..... dis 10
Machine Screw Taps ..... dis 55
Pipe Taps to 2½ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 55
Pulley Taps ..... dis 40

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@25
Prentiss ..... dis 20
Stephen's ..... dis 25@30
Barrett's ..... dis 30
Miller's Falls ..... dis 40
Merrill's ..... dis 15@20
Howard ..... dis 35

Wire.

New List, Apr. 9, 1894

Brass ..... dis 4c
Copper ..... dis 4c
Bright and annealed, Nos. 0@18 ..... dis 70&10@75
" " Nos. 19@26 ..... dis 75@75&5
" " Nos. 27@36 ..... dis 75&10&5
Coppered Nos. 0 to 18, market list ..... dis 70@70&5
Galvanized Nos. 0 to 18 " " ..... dis 65&5
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
annealed Fence, Nos. 6 and 9 ..... dis 75
Annealed Grape, Nos. 10 to 14 ..... dis 75
Stub's Steel Wire regular ..... .95c ℔ lb dis 30

Wrenches.

Coe's genuine ..... dis 50
Girard Standard ..... dis 70&15
Agricultural ..... dis 75&15
Mechanic's ..... dis 55&10&5
Bemis & Call's Combination ..... dis 30
Donohue's Engineers ..... dis 20&15
Lamson & Sessions Engineers ..... dis 65
Billings & Spencer's Drop Forged ..... dis 25
William's " " ..... dis 20
Alligator " " ..... dis 40

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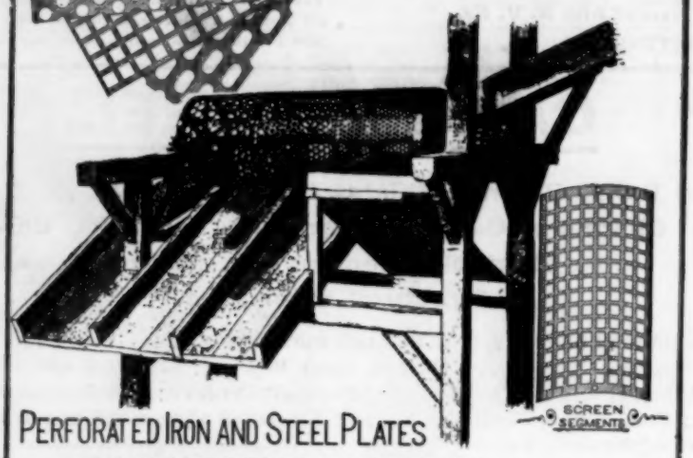

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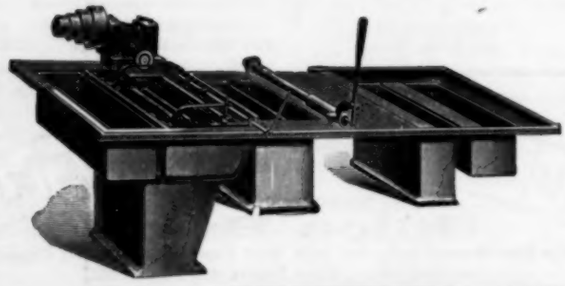

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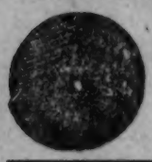

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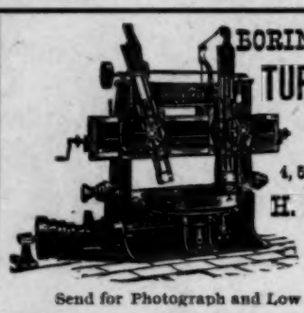

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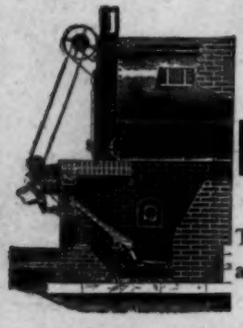

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